

681,8432

U.S. Patent Office

-1-

7893.

VOLUME IX.

GRAPHOPHONE PATENTS.

908,625 - 944,608.

January 5, 1909 - December 28, 1909.

T
223
P5066
1878
v. 9
NMAH

Able, Frank, Jr.	928,015 ✓
Andrews, Frank H.	924,527 ✓
Applegate, F. C.	939,119 ✓
" " "	939,120 ✓
Aylsworth, J. W.	920,245 ✓
" " "	932,237 ✓
" " "	936,275 ✓
" " "	940,631 x
" " "	944,474 x

Bastin, P.	916,973 ✓
Beaux De, Paul	916,976 ✓
Beecroft, C.	915,013 ✓
Benjamin & Handley	917,404 ✓
Berliner, E. M.	936,976 ✓
Berner, Paul B. T.	926,235 ✓
Blanch, T. J.	935,773 ✓
Buelna, G.	911,202 ✓
Buelna & Burson	930,038 ✓
" "	931,676 ✓
Burson & Buelna	930,038 ✓
" "	931,676 ✓

Cameron, Hinks-Martin, and Packman	921,835 ✓
Capps, Frank L.	941,975 x
Chapman, W. A.	943,339 x
Cheney, George K.	915,936 ✓
" " "	941,010 x
" " "	941,011 x
Claflin, Wilbur B.	917,925 ✓
Conger, J. H. B.	917,252 ✓
Cook, H. F.	933,234 ✓
Cunnius, A. R.	921,676 ✓
Curdy Mc, W. H.	909,645 ✓

De Beaux, Paul	916,976 ✓
Dennison, Wilburn N.	927,505 ✓
Duncan, G. W.	914,934 ✓
Dennison, W. M.	927,504

m (s.g. Private 19148) Nat. Law Book Co. 10 May 30 L.H.



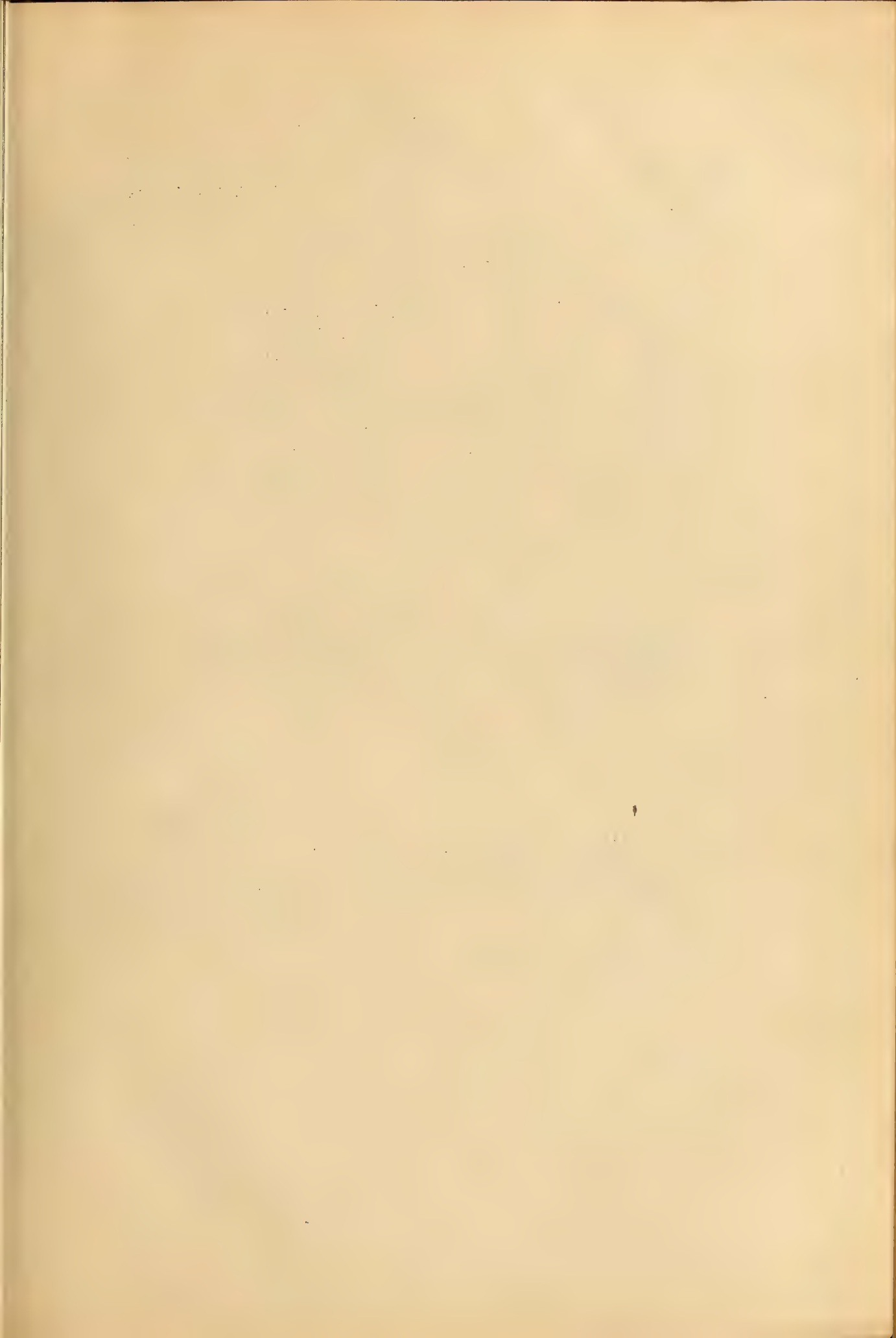
Edison, T. A.	936,267 ✓
" " "	939,992 ✓
" " "	943,663 x
" " "	943,664 x
Edmonds, D. S.	915,022 ✓
English, J. C.	940,794 x
" " "	940,795 x
" " "	940,796 x
Farrington, R. C.	916,287 ✓
Fischer, Alex	942,816 x
Fuller, Percy W.	934,601 ✓
Gemmill, J. I.	925,430 ✓
Georigi, J.	936,115 ✓
Gibson, R. L.	936,531 ✓
" " "	943,631 x
Gilbert, Elam	911,491 ✓
Goodale, F. C.	944,608 x
Haile, L. T.	914,826 ✓
" " "	919,856 ✓
" " "	923,119 ✓
" " "	924,456 ✓
Haines, J. H. J.	920,324 ✓
Hall, T. P.	910,529 ✓
Hamilton, C. F.	920,134 ✓
Handley & Benjamin	917,404 ✓
Hawthorne, E. A.	935,980 ✓
Hays, Louis H.	936,534 ✓
Hinks-Martin, Cameron, and Packman	921,835 ✓
Holman, F. E.	939,692 ✓
Hunter, R. M.	937,680 ✓
Jarde, H.	917,076 ✓
Keen, M.	929,859 ✓
" "	940,161 x
Keller, Alfred	925,346 ✓
" "	930,294 ✓
Kelly, H. C.	913,508 ✓
Kingsley, Hugh J.	936,910 ✓
Kitsee, Isidor	920,752 ✓
Koch, Henry	918,165 ✓
Kraemer, Thomas	910,208 ✓
" "	912,857 ✓
" "	913,828 ✓
Krueger, C.E. & W.H.	915,448 ✓
Lamb, C. I.	908,778 ✓
Landon, J. M.	922,297 ✓
Leschbrandt, E.	908,683 ✓
Long, W. T.	935,379 ✓

Macdonald, T. H.	934,450
" " "	934,451
" " "	936,646 ✓
" " "	942,089 x
McCurdy, W. H.	909,645 ✓
Miller, H. C. (Re-Issue)	12,963 ✓ - May 25, 1909
(Original)	793,013
Miller, H. C. (Re-Issue)	13,044 ✓ - Nov. 23, 1909
(Original)	793,013
Mills, H. S.	929,775 ✓
" " "	943,313 ✓
8- Munday, C. H.	908,877 ✓
Murdock, Frederick F.	927,809 ✓
" " "	937,459 ✓
Murphy, Francis M.	915,874 ✓
Noll, J.	919,293 ✓
Nuernberg, J. C.	930,683 ✓
Oliver, E. S.	932,055 ✓
Oppenheimer, Geo. A.	936,348 ✓
Osten, George	913,153 ✓
Ott, J. F.	932,314 ✓
" " "	936,265 ✓
" " "	936,270 ✓
" " "	936,271 ✓
" " "	936,272 ✓
" " "	936,273 ✓
Packman, Hinks-Martin, and Cameron	921,835 ✓
Pearson, J.	929,482 ✓
Peltier, Henry F.	917,790 ✓
Perrenot, George F.	937,641 ✓
Petri-Palmedo, D.	920,387 ✓
Pierman, A. N.	917,654 ✓
" " "	940,051 ✓
Possons, M. A.	931,957 ✓
Prescott & Schramek	913,765 ✓
Reed, T. P.	925,025 ✓
Reinhardt, C.	909,455 ✓
Rose, O. G.	912,735 ✓
" " "	916,603 ✓
" " "	916,604 ✓
" " "	921,465 ✓
Rosenfield, Wm. W.	918,915 ✓
Rumble, C. A.	932,061 ✓
Runge, W. C.	943,568 ✓



Schramek & Prescott	913,765
Schroder, H.	909,461
" "	919,252
Shaffer, F.	929,505
Sheble, Horace	912,425
Shepard, Edward P.	925,938
Shephard, George	912,039
Sheppy, F.	929,253
Smith, A. J.	940,436
Smith, Harry A.	941,546
Smith, R. B.	908,897
" " "	925,846
" " "	936,826
Smith, Walter	939,753
Soistmann, A. G.	944,516
Stuart, Harve R.	936,490
Sullivan, J. E. & W. B.	918,389
Tanner, W. J.	908,625
Tatelbaum, William	931,161
Valiquet, L. P.	914,765
" " "	938,185
Wangemann, A. T. H.	913,930
Weber, Peter	932,200
" "	932,201
" "	932,202
" "	936,266
" "	937,905
" "	942,475
Wellner, Julius	928,567
Wickes, C. S.	941,291
Wittig, H. F.	910,103
Wolke, H.	932,222
" "	936,264
" "	936,263
" "	936,269
" "	936,274
Woods, Harry E.	918,111
Wooster, W. W.	939,781
Young, W. W.	940,109
Zackey, W. W.	930,715





APPLICATION FILED SEPT. 18, 1905.

3 SHEETS—SHEET 1.

A technical drawing of a mechanical device, likely a pump or valve, shown in a cross-sectional view. The device consists of a central rotating component (10) with a circular face (4) and a central shaft (3). This central component is housed within a cylindrical casing (9). The casing is supported by a base (2) which has two vertical supports (6) on either side. The base is secured by two large bolts (5) on the left and right. The central shaft (3) is connected to a horizontal shaft (40) that passes through the casing. The entire assembly is mounted on a base (2) which is secured by two large bolts (5) on the left and right. The base is supported by two vertical supports (6) on either side. The central shaft (3) is connected to a horizontal shaft (40) that passes through the casing. The entire assembly is mounted on a base (2) which is secured by two large bolts (5) on the left and right. The base is supported by two vertical supports (6) on either side.

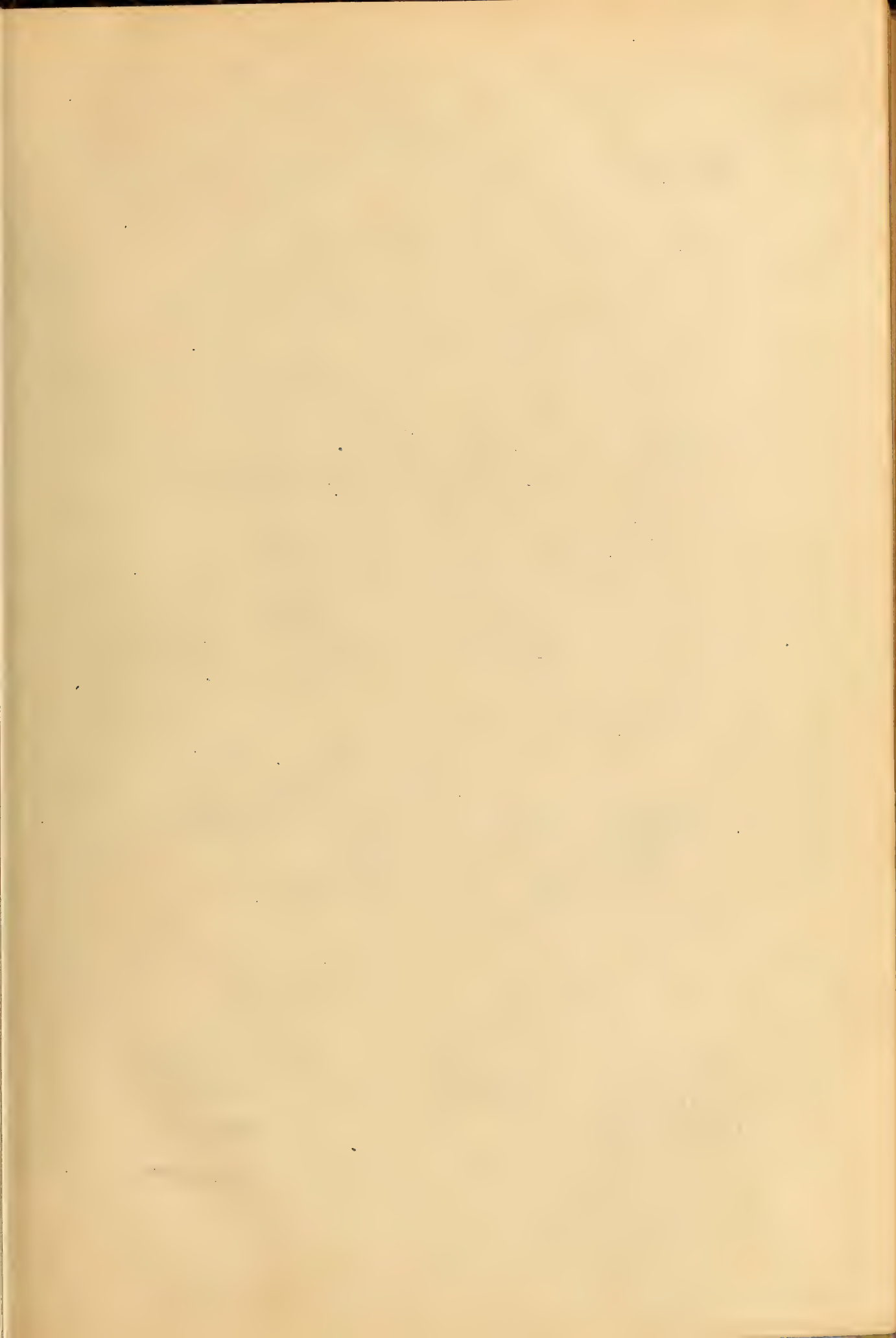
Fig. 5.

24^b 24^e 24^a 24^c

31

H. A. Lamb.
S. J. Chapple.

INVENTOR
William J. Tanner.
BY Geo. O. Phillips
his ATTORNEY



908,625.

Patented Jan. 5, 1909.

3 SHEETS—SHEET 2.

Fig. 7.

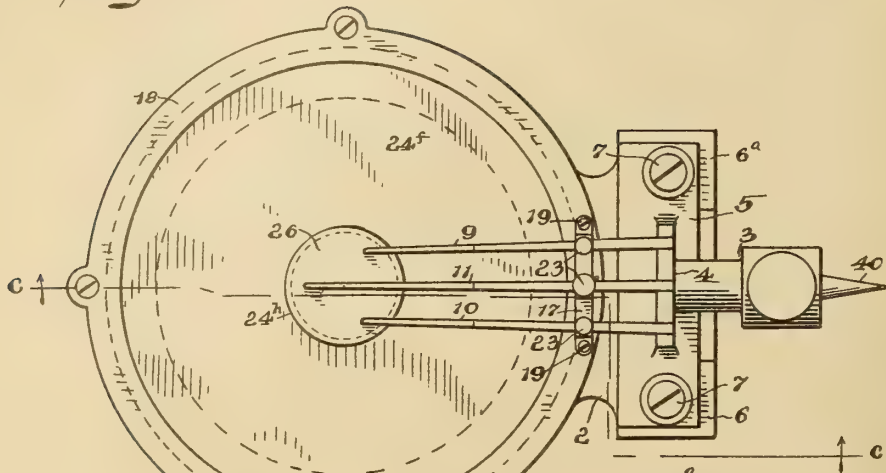


Fig. 12.

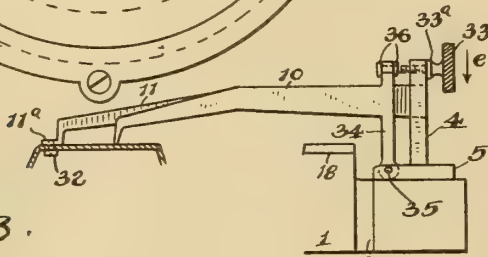


Fig. 8.

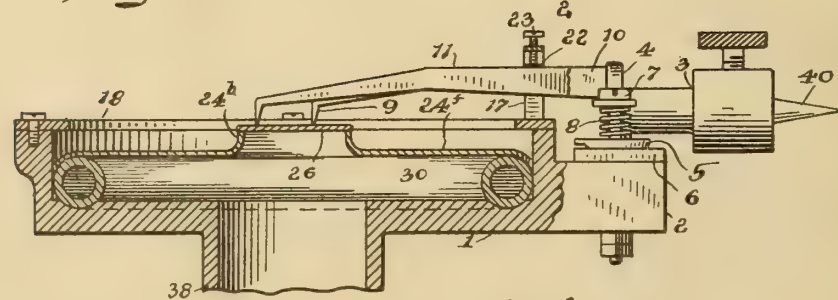


Fig. 9.

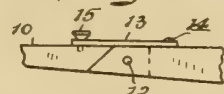


Fig. 10.

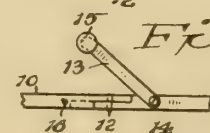
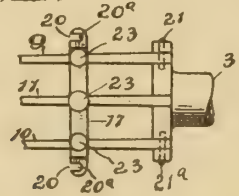


Fig. 11.



WITNESSES

H. A. Lamb.
B. J. Chaffee.

INVENTOR

William J. Tanner.

BY Geo. Phillips.

his ATTORNEY

908,625.

Patented Jan. 5, 1909.

3 SHEETS—SHEET 3.

Fig. 14.

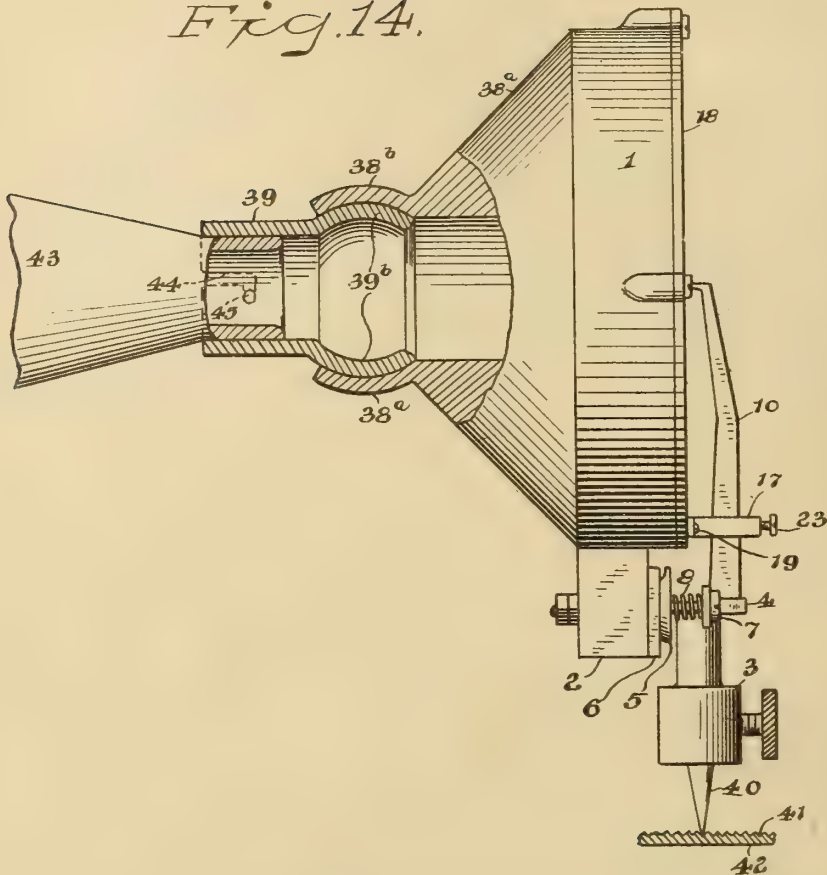
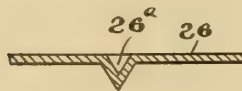


Fig. 13.



WITNESSES

H. A. Lamb.
B. J. Chaffin

INVENTOR

William J. Tanner.

BY Geo. D. Phillips
his ATTORNEY

UNITED STATES PATENT OFFICE.

WILLIAM J. TANNER, OF BRIDGEPORT, CONNECTICUT.

SOUND-BOX.

No. 908,625.

Specification of Letters Patent.

Patented Jan. 5, 1909.

Application filed September 18, 1905. Serial No. 278,861.

To all whom it may concern:

Be it known that I, WILLIAM J. TANNER, a citizen of the United States, and a resident of Bridgeport, in the county of Fairfield and State of Connecticut, have invented certain new and useful Improvements in Sound-Boxes, of which the following is a specification.

My invention relates to improvements in recording and reproducing sound for sound-boxes for talking machines, and it consists in certain details of construction to be more fully set forth in the following specification.

To enable others to understand my invention reference is had to the accompanying drawings in which:

Figure 1— is an upper plan view of a sound-box embodying my improvements, among which, may be mentioned, the double needle-arm: Fig. 2— is a broken sectional view on line *a a* of Fig. 1: Fig. 3— is a sectional view through the case bracket and soft metal seats of the needle arm support on line *b b* of Fig. 1: Fig. 4— is a central sectional detail view of a diaphragm similar to the one shown at Fig. 2 except that the edges are flanged: Fig. 5— is a detail central sectional view of a diaphragm having a raised solid center: Fig. 6— is a broken detail modification of the needle-arm: Fig. 7— is an upper plan view of the sound-box showing a plurality of needle-arms: Fig. 8— is a broken vertical sectional view on line *c c* of Fig. 7: Fig. 9— is a broken detail side elevation of one of the needle-arms jointed in the body portion: Fig. 10— is a broken plan view of Fig. 9: Fig. 11— is a broken upper plan view of the needle-arm support and broken view of three needle-arms mounted therein, two of which are pivotally supported, showing also a modified construction of the muffler standard. Fig. 12— is another view showing an arrangement for moving the whole needle-arm: Fig. 13— is a detail broken sectional view of a diaphragm with a depression in the surface to receive the sharp pointed end of the needle-arm: Fig. 14— is a side elevation of a sound-box, broken sectional view of its socket, sectional view of the sleeve with a ball and socket connection between the sleeve and socket, and broken view of a sound-box supporting arm, and also a broken sectional view of a record disk.

Its construction and operation are as follows:

1 represents the case usually employed in instruments of this character.

2 is a bracket projecting from the case and integral therewith. 3 the needle holder. The needle-arm support 4, and the semi-circular base 5 are, preferably, made of one piece. This base is adapted to rest in semi-circular non sound conducting seats 6 and 6^a, and it is frictionally secured thereto by the slot headed bolts 7.

8 are springs, one only being shown at Figs. 2 and 8. These are interposed between the heads of the bolts 7 and the base 5.

One feature of my several improvements consists in employing a plurality of needle-arms from two to any number that may be found most desirable to effect the best results. Increasing the number of arms improves the tone; making it more mellow and rounded.

In Figs. 1, 2 and 3, two arms, 9 and 10, are employed with their rear ends anchored in the upright or support 4. In Figs. 7 and 8 another and central arm 11 is employed. All but one of these arms can be arranged to be swung out of contact with the diaphragm and thereby regulate the tone in accordance with the record desired to be played. This can be done in various ways, among which I show, Figs. 10 and 11, the arm 10 jointed so that the forward end of the arm is adapted to be turned upward by swinging on the pin 12.

13 is a horizontally swinging plate pivotally supported on the screw 14 of one of the arm sections, while 15 is an attaching screw adapted to engage with the threaded hole 16 in the other arm section when desired to clamp the two sections together.

In Figs. 1, 2, 7 and 8, the muffler standard 17 is secured to the case ring 18 by means of the screws 19. In Fig. 12 is shown a modification of this standard in which the slots 20 open into the screw holes 20^a so that, this standard can readily be removed whenever it is desirable to temporarily elevate one of the needle-arms, which movable arms, in this construction, are pivotally supported on the pins 21 and 21^a located in the needle-arm support 4. The muffler 22 is raised and lowered, Figs. 2 and 8, by means of the screws 23.

Mica is the principal material now used for diaphragms. I have, however, found that celluloid alone or combined with mica, or like material gives much better results.

5 For band records, where it is necessary to bring out all of the instruments, I have found that a diaphragm made entirely of celluloid gives the best results. In vocal records, where it is necessary to sharpen the
10 tone, a combination of two different materials, like, for instance, celluloid and mica, give better results than where the diaphragm is all made of one material. Good results are also obtained by diaphragms
15 made of vegetable matter like, for instance, wood, and particularly the inner surface of the bark of trees.

In Figs. 1, 2 and 4, the large or outer diaphragm 24 is provided with the raised central portion or curb 24^a having the central hole or opening 25. 26 is a small mica diaphragm overlying this opening and it is secured in position by cement or any other suitable means. 27 is a small circular disk
20 of any suitable material interposed between the small mica diaphragm and the needle-arm points. This disk will serve to prevent the sharp point of the needle-arm scratching or marring the diaphragm. It can also
25 be used as means to unite the points of the plural arms into, virtually, one contact point. If desired, the slight depression 26^a, Fig. 13, could be formed in the upper surface of the diaphragm to receive the sharp
30 point of the needle-arm. This will keep the point of the arm in one unchangeable position. The large diaphragm 24 is stiffened by means of the radial ribs 24^b. In Fig. 5 is shown the diaphragm 24^c and the
35 raised central portion 24^d together with the upper needle-arm contact surface 24^e as being all of one piece and that, preferably of celluloid. In Figs. 7 and 8 the larger or outer diaphragm 24^f is devoid of ribs and
40 the small central diaphragm 26 rests on top of the curb 24^b instead of being seated in a depression formed on the curb 24^a shown at Figs. 1, 2 and 4.

In Fig. 2 is shown the flexible tube 28 and the case-ring 18, which, in connection with the ring 29, made of bamboo, rubber, or other like substance, assist very materially in lengthening the vibratory sound waves. In Fig. 8 the large flexible tube or gasket 30
50 supports the diaphragm 24^f whose outer curved edge 24^g partially embraces said gasket. This feature of curving the edge of the diaphragm, see also Fig. 5, downwards, will cause it to lie snugly on the gasket, and thus obviate the necessity of placing a second gasket above the diaphragm. The pressure of the needle-arm will depress the diaphragm in its central portion, and, when the diaphragm is straight, will cause its outer
60 edge to curl or turn upward and produce

a false sound or "blast." This is entirely overcome by curving the edge of the diaphragm downward.

If desired, the main body portion of the needle-arm may be made of a single piece
70 while the contact ends 31 may be formed, "comb" like," as shown at Fig. 6.

If desired, the arm or arms adapted to be continually held in contact with the diaphragm, can be secured in any desirable
75 manner.

In Fig. 12 the arm 11 is provided with the foot 11^a and the binding screw 32.

The means for elevating the side movable needle-arms, whether single or double, 80 shown at Fig. 12, is by the screw 33 passing through a threaded hole in the support 4, with its free end revolubly mounted in the rocker arm 34, which arm is pivotally supported on the pin 35 of the base 5. 36 are
85 collars on each side of the upper end of this rocker arm to prevent end play in the elevating screw 33. Turning this screw in the direction of arrow *e* will withdraw the shoulder 33^a from contact with the vertical
90 face of the support 4 a distance sufficient to elevate the diaphragm contact point of the needle-arm 10 so as to carry it out of engagement with the diaphragm. To reengage the movable needle-arm with the diaphragm,
95 turn the screw 33 in the opposite direction until the shoulder 33^a rests against the support 4, which shoulder will act as a stop to limit the pressure of the needle-arm against the diaphragm. The advantage of being
100 able to raise one or more of the arms out of contact with the diaphragm enables the volume and tone to be readily and quickly changed to suit the character of the record.

37, Fig. 2, is a piece of rubber or other
105 non metallic substance interposed between the springs 8 and the base 5 to serve as insulators to counteract or soften the metallic vibrations.

It will be understood that, in all of the
110 constructions shown, whether the points of the needle-arms are free or secured to the diaphragm, it is important that the contact of the needle-arm with the diaphragm be such as to insure that both the diaphragm
115 and needle-arm vibrate in perfect unison.

A large per cent. of the unharmonious sound emanating from a talking machine is due to the bad tracking of the needle. In other words, the spiral groove in the upper
120 surface of a disk-record, in which the needle travels, is very apt to be more or less irregular as to its spiral formation so that, the needle, instead of keeping where it should, viz: at the bottom of this groove, is forced,
125 at times, hard against the sides. This irregular tracking produces a disagreeable rasping sound and very unpleasant to the listener. Another disadvantage of irregular tracking is that the wearing qualities of the
130

needle are very much shortened so that, the needle is thrown away after it has traveled over a record but once, besides, the record itself is also damaged to a more or less extent.

I have completely overcome the objectionable features above set forth by the construction shown at Fig. 14, wherein a ball and socket connection, presently to be described, is formed between the sound-box and the sound-box supporting arm. 38^a is a socket integral with the sound-box case 1, which socket, in this construction, is made heavier than the usual sockets, 38, Figs. 2 and 8, for the purpose presently to be described. 39 is a sleeve having the ball shape formation 39^a, which, together with the shell or ball shape formation 38^b, on the outer end of the socket 38^a, forms a ball and socket joint which allows a free movement to the sound-box in any direction. This enables the extreme point of the needle 40 to maintain its correct position at the bottom of the groove 41 of the record disk. For it will readily be seen that, if the sound-box can be allowed to follow the irregularities of the spiral groove, the needle will naturally gravitate to the bottom of the groove, and, always working in the bottom of the groove, and out of contact with the sides thereof, the needle, will not only stand up to its work much longer, but the objectionable features, above noted, will also be eradicated. As the ball and socket connection makes the position of the sound-box, balanced on the fine needle point, very sensitive, and liable thereby to jump out, I find it necessary to add sufficient weight to counteract this tendency. This I have shown by increasing the base of the size of the socket 38^a, close to the sound-box. This weight, however, can be otherwise applied, either by increasing the weight of the socket, or the case of the sound-box, or in any other desirable manner found most convenient to effect a good working balance of the box on the needle point. This weight should, however, be placed, as near as convenient, directly over the needle so as to obtain all of the advantages necessary to produce the best results, and thus relieve the needle of any tendency to drag a load which would cause it to deviate from the bottom portion of the spiral groove: Therefore, it will be observed that, the greatest amount of metal in the socket 38^a is close to the sound-box. While a ball and socket connection could be placed at some point in the supporting arm 43, the result would not be the same as I now obtain. for the reason that, the farther this connection is removed from the sound-box, the more the box will be thrown out of balance, and, consequently, the greater will be the amount of metal to be carried by the box,

and the greater will be the drag on the needle.

The outer end of the sleeve 39 and the supporting arm 43 are removably connected together by means of the angular slot 44 and pin 45.

While I use the term "ball and socket joint" to express the means whereby the sound-box is permitted to move in any direction. I desire it to be understood that this term covers a swivel joint, or universal joint or any well known means adapted to give like results.

While I show the points of the needle arms adapted to be secured to the plate 27 so that said arms will be tied or united at the said points, I hold myself at liberty to tie said arms together at any other point in their length that will be found most convenient.

Having thus described my invention what I claim as new and desire to secure by Letters Patent is:

1. In a sound-box, the combination with the case 1 having the bracket 2, of the semi-circular concave seats 6 and 6^a located in said bracket, needle-arm support 4 provided with the semi-circular base 5 adapted to oscillate in said seats, bolts 7 adapted to operatively secure contact between said base and seats, springs on said bolts and above said base to maintain working contact between said base and seats, for the purpose set forth.

2. In a sound-box, the combination with the case and diaphragm, of a plurality of needle arms united into, practically, a single structure, and means common to the arms for operatively connecting the same to the diaphragm, for the purpose set forth.

3. In a sound-box, the combination with the case and a diaphragm, of a plurality of needle arms united at some point in their length and out of contact with each other except at the point of union, and means common to said arms for operatively connecting the same to the diaphragm, for the purpose set forth.

4. In a sound box, the combination with the case, and a diaphragm, of a plurality of arms associated with said diaphragm for transmitting the vibrations, means common to said arms for operatively connecting the same to the diaphragm, and means for adjusting said arms in relation to the diaphragm for regulating the volume of sound.

5. In a sound box, the combination with the case, and a diaphragm, of a plurality of arms associated with said diaphragm for transmitting the vibrations, and means interposed between the ends of said arms and the diaphragm and constituting a common means for operatively connecting the arms to the diaphragm.

6. In a sound box, the combination with the case, and a diaphragm, of a plurality of arms associated with said diaphragm for transmitting the vibrations, said arms extending in substantial parallelism with each other, and means connecting the ends of said arms and the diaphragm and constituting a common connection for the arms with the diaphragm, whereby the vibrations are

caused to be transmitted in a uniform volume.

Signed at Bridgeport in the county of Fairfield and State of Connecticut this 11th day of Sept. A. D. 1905.

WILLIAM J. TANNER.

Witnesses:

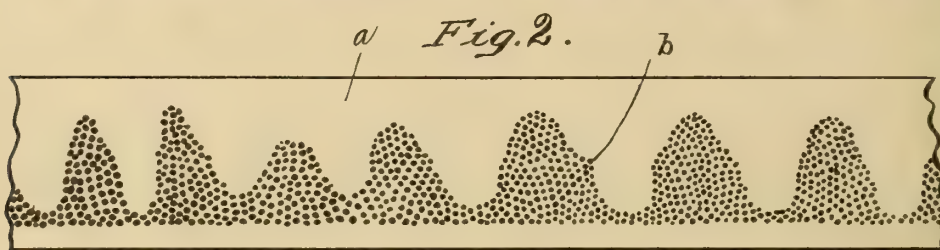
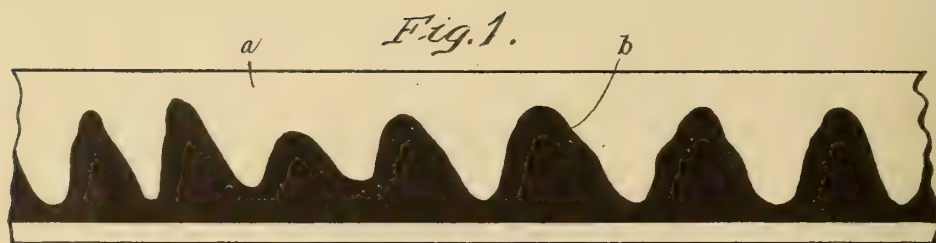
HENRY A. HOUSE.

FRANK B. FELTON.

E. LESCHBRANDT.
SOUND REPRODUCING RECORD.
APPLICATION FILED JUNE 2, 1906.

908,683.

Patented Jan. 5, 1909.



WITNESSES:
F. J. Hartman.
G. E. Moister

INVENTOR
E. Leschbrandt
BY *Chas. A. Putter.*
ATTORNEY.

UNITED STATES PATENT OFFICE.

EINAR LESCHBRANDT, OF PHILADELPHIA, PENNSYLVANIA.

SOUND-REPRODUCING RECORD.

No. 908,683.

Specification of Letters Patent.

Patented Jan. 5, 1909.

Application filed June 2, 1906. Serial No. 319,855.

To all whom it may concern:

Be it known that I, EINAR LESCHBRANDT, a subject of the King of Norway, and a resident of the city and county of Philadelphia, State of Pennsylvania, have invented certain new and useful Improvements in Sound-Reproducing Records, of which the following is a specification.

My invention relates to an improved sound reproducing record, and it consists of a strip of paper, or other suitable material, provided with an air pervious pattern corresponding in form to the sound wave or waves to be reproduced.

Sound is, or consists of, a series of rarefactions and condensations, of the air and, as is well known, rarefactions and condensations may, by means that are well known and which it will be unnecessary to describe here, be photographed or otherwise graphically represented upon a photograph plate or film or other article. The graphic representation of the sound waves appears as an irregular line. If the plate, film or strip carrying the irregular line representing the sound waves be perforated or otherwise made air pervious, to one side of said line, the sounds corresponding to said pattern may be reproduced by passing a current of air through said perforations.

In the accompanying drawings Figure 1 represents a film or strip of material carrying a graphic representation of a sound wave, and Fig. 2, the same perforated.

a is a strip or ribbon of paper, or other suitable material, carrying a pictorial repre-

sentation of the sound wave or waves to be reproduced. The representation of the sound waves may be formed in any suitable manner but for accuracy and convenience I prefer to form them photographically and to this end the strip or ribbon of paper is coated with, or is formed of, a photographic film which is exposed to a beam of light which, through suitable means not necessary to mention here, is made to vibrate in unison with the sounds. This beam of light being caused to impinge upon the moving film there will be recorded thereon the movements of the beam and the film being developed in the usual manner of photographic films or plates will show a figure *b* of irregular outline which will be in fact a photographic negative of the sounds.

To reproduce the sounds either the record itself, or a counterpart of it, which has been perforated as shown in Fig. 2, or other wise made pervious to air, is drawn past an aperture through which air is drawn or blown, the result is a reproduction of the original sounds.

Having thus described my invention I claim:—

A sound reproducing record consisting of a strip of paper, or other suitable material, provided with an air pervious pattern corresponding in form to sound waves previously impressed or formed thereon, and adapted to the passage therethrough of a current of air.

EINAR LESCHBRANDT.

Witnesses:

GEORGE W. SELTZER,
CHARLES A. RUTTER.



C. I. LAMB.
SOUND REPRODUCING MACHINE.
APPLICATION FILED JAN. 28, 1907.

908,778.

Patented Jan. 5, 1909.

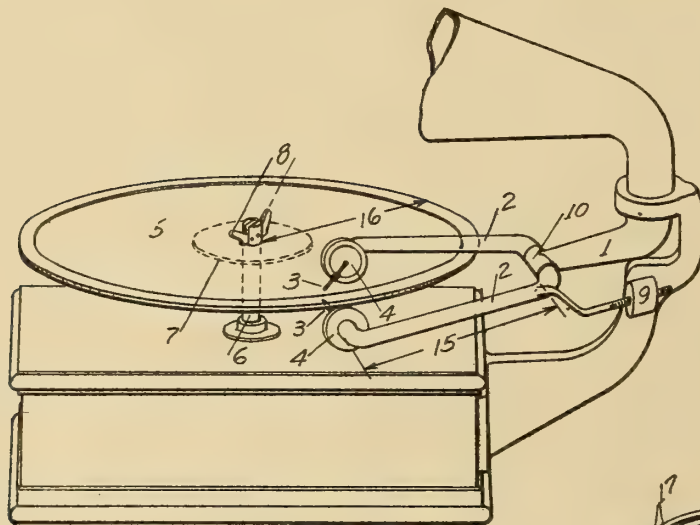


Fig. 1.

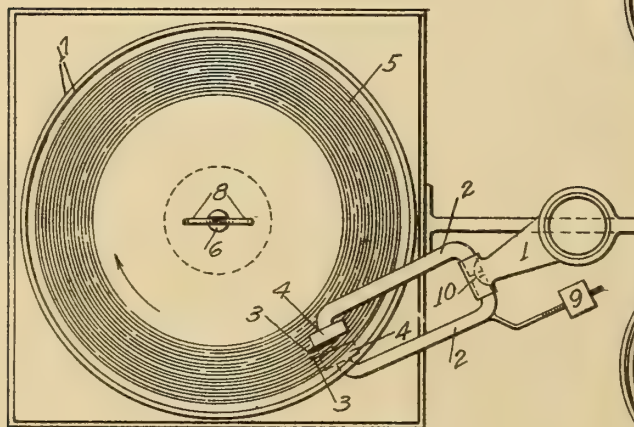


Fig. 2.

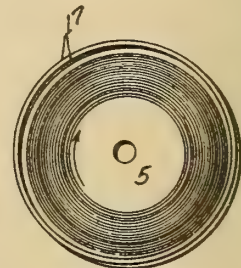


Fig. 3.

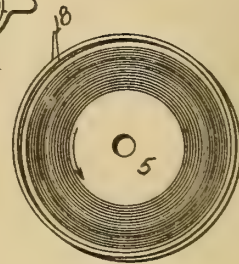


Fig. 4.

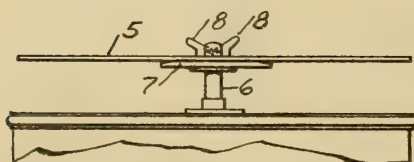


Fig. 5.

WITNESSES:

Don Lelan Stanford
[Signature]

BY

INVENTOR
Charles Ira Lamb

Henry P. Fry.
ATTORNEY.

UNITED STATES PATENT OFFICE.

CHARLES IRA LAMB, OF CHATTANOOGA, TENNESSEE.

SOUND-REPRODUCING MACHINE.

No. 908,778.

Specification of Letters Patent.

Patented Jan. 5, 1909.

Application filed January 28, 1907. Serial No. 354,570.

To all whom it may concern:

Be it known that I, CHARLES IRA LAMB, a citizen of the United States, residing at Chattanooga, in the county of Hamilton and State of Tennessee, have invented new and useful Improvements in Sound-Reproducing Machines, of which the following is a specification.

My invention relates to improvements in apparatus for recording and reproducing sounds, the improvements being directed to that kind of sound recording and reproducing apparatus, wherein a tablet or disk record is used, with a stylus carried on a lever, moving eccentrically with reference to the center of the record tablet; the purpose of the invention being the permitting of the reproduction of sound with much clearer tone and better volume than is now allowed by apparatus of the kind mentioned.

One feature of my invention relates to the construction of a double sound producing record tablet or disk record, and another feature, to means for adjustment in combination therewith. Each of the two features of improvement is designed to overcome certain difficulties and imperfections which have been heretofore encountered in the operation of sound reproducing machines, and more particularly to eliminate the harsh tones of some of the machines of the class described, by causing a louder tone of more volume to be reproduced.

With the objects stated in view, my invention consists in the novel construction and combination of parts, hereinafter described, with reference to the accompanying drawings, and more particularly pointed out in the claims.

In the drawings: Figure 1 is a side elevation of an apparatus for reproducing sound, embodying my invention; Fig. 2 is a plan view of the arrangement of the two sound boxes; Fig. 3 is a view of the disk showing the direction of the lines indicating the sound indentations; Fig. 4 is a view of the lower side of the disk showing the lines indicating sound indentations; and Fig. 5 is a detail view showing the axis on which the disk rotates bringing it into contact with the reproducers.

Referring to the drawings, in which the same reference numerals indicate the same or corresponding parts of the mechanism throughout the drawings, and particularly Fig. 1, the bracket arm 1 supports the two arms 2, one of which terminates in a sound

box 4, while the other terminates in another sound box 4. The needles 3 contact with the disk 5, and, by encountering the indented lines, cause the sound to be conveyed by means of the usual means employed in such instruments to the ear of the listener.

The numeral 6 represents the axis upon which the disk 5 rotates, and 7 is the axis plate on which the disk rests; two springs 8 prevent the disk from slipping, and hold it in a position of rigidity. The two sound boxes 3 are held in place by the joint 10. To the lower arm 2 is fastened a weight 9 which causes the needle 3 to press against the lower side of the disk 5. The two arms 2, being thus connected to the joint 10, provide for communication with a common outlet.

In Figs. 3 and 4 is shown the manner in which the lines causing the reproduction of the sound run, by reference to which it will be noticed that the lines on the lower side, shown in Fig. 4, run in the opposite direction to those on the upper side, as indicated in Fig. 3. The reason for this is that the idea of the invention is to have a double disk or record having the same sounds to be reproduced and requiring the needles to constantly be upon the same sound, as the disk rotates around the axis.

In Fig. 5 is shown the axis 6 which is connected with the mechanism running the machine, causing it to rotate. The disk is placed over the upper end and rests firmly on the disk plate 7, firmly fixed to the axis and is a part of same, while the disk is held in place by the springs 8, adapted to be released when it is desired to take the record off the axis.

Having thus described the various parts, it now remains to show the manner in which each is to operate. In an apparatus of this character using the flat disk, rotating around the axis of the machine, only one side, the upper surface, has been utilized for the purpose of reproducing sound. Formerly, the disk rested on a felt base directly on the top of the box containing the mechanism of the sound reproducing machine; in my invention, the disk is several inches above (Figs. 1 and 5) so that the reproducers, two in number, can rest one above the disk and the other underneath, (Fig. 1), and as a sound is reproduced by the upper reproducer the identical sound is reproduced by the sound reproducer which contacts with the lower side of the disk. As a result of this construction,

a greater volume of sound is reproduced from the double record, adding purity to the tones of the sounds so reproduced, and strengthening the reproduced sounds in such a manner as to reproduce the sounds with a minimum of the harsh metallic resonance experienced in other sound reproducing apparatus, prior to my invention.

In the adjustment of the disk and the construction of the parts carrying the reproducers, care must be exercised so that the disk will be enabled to have room between its center and circumference equal to the distance from the edge of the disk to the joint holding the two reproducers. In other words the distance 15, must be equal to the distance 16, see Fig. 1.

It is essential that the needles commence and remain on the corresponding parts of the records in the opposite faces of the record disk, and especially is it a requisite that they do not slip off the record; hence, I have provided an embossed ridge shown in Fig. 3 and Fig. 4 by the lines 17 and 18.

In the disk to be used in the invention, both sides are to be utilized for the reproducing of sound, the only difference between the sides being the fact, as previously mentioned, that the lines on the lower side run in a reverse manner to the lines in the upper side. In the preparation of the disk, the method to be used can be either the stamping from the same plate, in regular and reverse order, or the simultaneous stamping from two plates, one being the reverse of the other, either method sufficing.

Having now fully described my invention,

what I claim as new, and desire to secure by Letters Patent is:

1. In a machine of the class set forth, a rotatable record disk having similar sound records upon its opposite faces, means for simultaneously reproducing sound from said records, and a common outlet for the sound reproduced from both of said records, substantially as described.

2. In a machine of the class set forth, a horizontal rotatable record disk having similar sound records upon its opposite faces, means for simultaneously reproducing sound from said records, the sound boxes of which are carried by separate arms above and below the disk, a common outlet to which the arms are connected, and a counterbalance for the lower arm adapted to press the stylus of the sound box carried thereby into contact with the lower face of the disk, substantially as described.

3. In a machine of the class set forth, a rotatable record disk having similar sound records upon its opposite faces, means for simultaneously reproducing sound from said records, the lines of the sound records on the opposite sides of said record disk running in opposite directions, and a common outlet for the sound reproduced from both of said records, substantially as described.

In testimony whereof, I have signed my name to this specification in the presence of two subscribing witnesses.

CHARLES IRA LAMB.

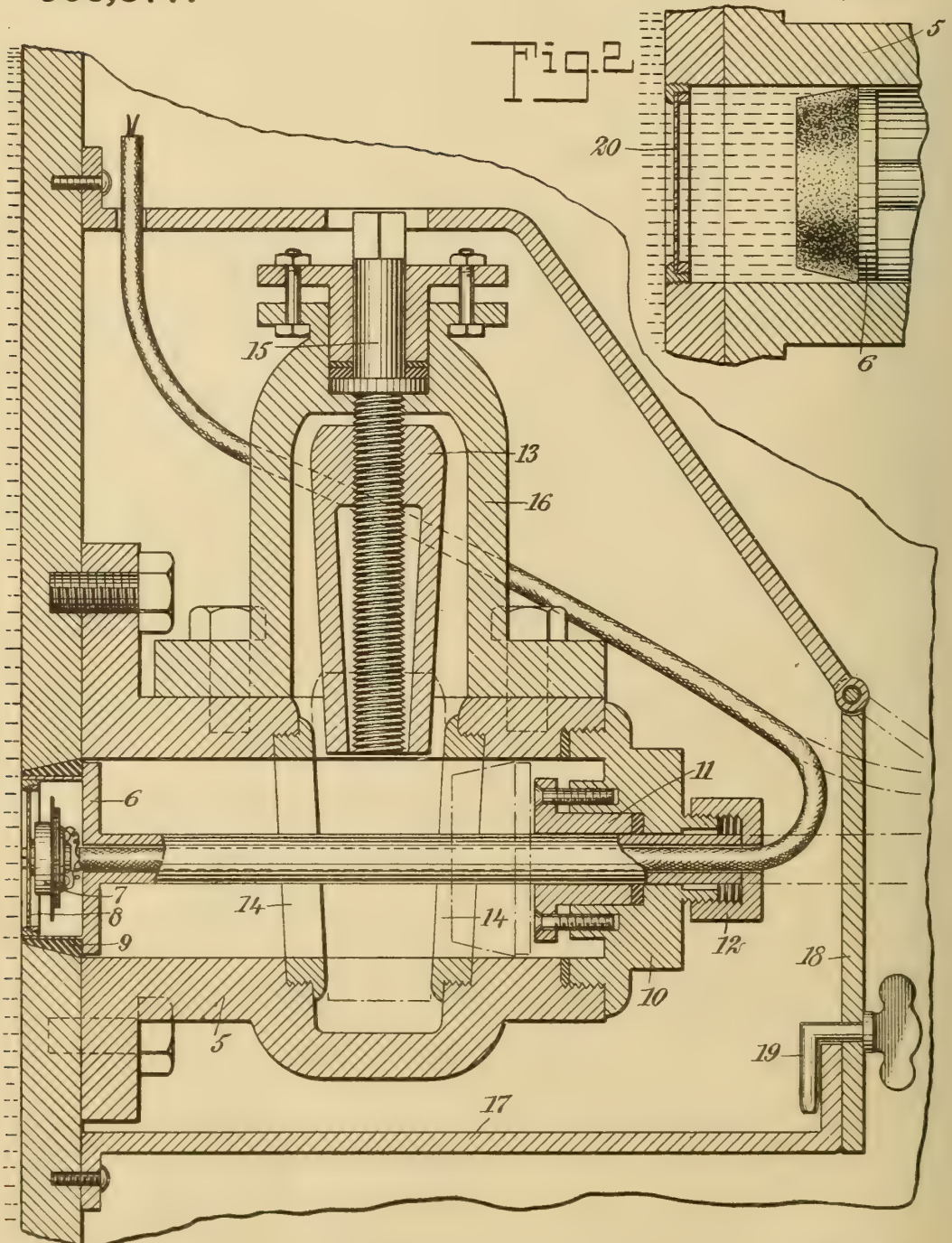
Witnesses:

E. L. WHITAKER,
O. SWANEY.

C. H. MUNDY.
 APPARATUS FOR RECEIVING SUBMARINE SIGNALS.
 APPLICATION FILED APR. 21, 1908.

908,877.

Patented Jan. 5, 1909.



WITNESSES
J. A. Proply
W. H. S. S. S.

Fig. 1

INVENTOR
Charles H. Mundy
 BY *Mumfords*

ATTORNEYS

UNITED STATES PATENT OFFICE.

CHARLES HOSKINS MUNDY, OF METUCHEN, NEW JERSEY, ASSIGNOR TO FLORA B. MUNDY, TRUSTEE, OF NEWTONVILLE, MASSACHUSETTS.

APPARATUS FOR RECEIVING SUBMARINE SIGNALS.

No. 908,877.

Specification of Letters Patent.

Patented Jan. 5, 1909.

Application filed April 21, 1908. Serial No. 428,427.

To all whom it may concern:

Be it known that I, CHARLES H. MUNDY, a citizen of the United States, and a resident of Metuchen, in the county of Middlesex and State of New Jersey, have invented a new and Improved Apparatus for Receiving Submarine Signals, of which the following is a full, clear, and exact description.

This invention is an improvement in submarine signal receivers such as are placed on board ship for the interception of warning sounds. Such devices as now existing or heretofore suggested, may be divided into three different classes: first, apparatus to be lowered over the side of the ship into the water; second, apparatus fastened to the outside skin of the ship, but not accessible from within; and third, apparatus fastened to the inside skin of the ship and accessible from within. The first class yields the best results in so far as loudness and distinctness of sound is concerned, and the third class is in these respects the least efficient; yet the latter has been adopted in commercial use because of the difficulty of handling the first in stormy weather while the ship is in motion, as well as its liability to injury. The second class although presenting all of the advantages of the first, with the additional advantage that it is unaffected by stormy weather, is, however, objectionable for the reason that it is inaccessible for the purpose of making repairs, etc.

My invention belongs to a fourth class of this art, which possesses all the advantages enumerated of the first three classes and others, the same consisting of a sound transmitter exposed directly to the sea and accessible from within the ship, and is distinguished from other inventions of this class in that the transmitter proper may be removed and replaced while the ship is afloat without taking water within the ship.

Reference is to be had to the accompanying drawings forming a part of this specification, in which similar characters of reference indicate corresponding parts in both views.

Figure 1 is a central vertical section through a submarine receiving apparatus applied to a ship and embodying my invention; and Fig. 2 is a fragmentary sectional view illustrating a slight modification.

In carrying out my invention I provide a chamber preferably a cylinder 5, which is bolted or otherwise secured to the inside of

the hull or skin of the ship, in register with an opening formed in the latter, which, as shown in Fig. 1, is of tapering form with the enlarged portion at the inside. This cylinder may be installed at any point on the hull below the water line, as, for example, in the cut-water on the bow of the vessel, in which position sounds ahead and from either side of the ship would be heard with equal clearness. Movable within the cylinder is a piston 6, the head of which is hollow and contains any of the usual or other form of transmitter 7, inclosed on the front by the diaphragm 8, which, by reason of the opening in the hull, is exposed directly to the sea.

The piston head is of a form to closely fit the opening in the hull, and when firmly pushed to its seat in that type of the invention shown in Fig. 1, will be substantially flush with the hull's outer surface. If the piston head be made of metal, such as brass, and the hull be of iron, it is desirable that a gasket of rubber or some equally efficient substance, 9, be placed about the piston in order to avoid electrolysis; said gasket also serving as a cushion between the receiver and the skin of the ship, so as to give close phonetic contact between them, and in any case there should be one or more grooves between the piston head and the skin of the ship, so as to permit free passage of water from the open sea into the chamber when the piston head or receiver is pressed firmly into position and flush with the outside skin of the ship.

The inner end of the cylinder is closed by a removable head 10 having a stuffing-box 11 through which the stem of the piston passes, forming therewith a water-tight joint around the head. On the outside of the head is threaded or otherwise adjustably attached, a thimble 12 which operates when screwed up to firmly force the piston head to its seat in the hull of the ship. The piston stem, it will be observed, is made hollow, and the thimble 12 is provided with a registering central opening through which pass electric conductors leading from the transmitter to the telephone receiver, which is ordinarily located in the pilot house. At an intermediate point of the cylinder, preferably near its center, a valve is provided, which I have shown in the form of an ordinary gate valve comprising the wedge-shaped valve-head 13, seating between two reversely inclined rings 14, detachably fitted at opposite sides of an

enlargement in the cylinder. The head 13 is operated by a screw 15, revolvably mounted in the top of a dome 16, which latter is secured to the cylinder over the opening therein through which the gate valve moves.

After the apparatus thus far described is installed in the ship, it is preferably inclosed in a casing 17, which, in the present form of the invention shown, is provided with a hinged door 18, at the front, adapted to be held in closed position by a thumb latch 19; the casing also having openings, respectively for the passage of the conductors and for the operation of the gate valve.

In some instances it may be found desirable to protect the transmitter from sea growth and other deranging influences from without, for which purpose I have shown in Fig. 2, a screen 20 arranged over the opening in the hull of the ship. In this particular form of the invention shown, the transmitter is not designed to be brought flush with the outer surface of the hull, as in the type of the invention illustrated in Fig. 1, but it may be placed in whatever position in the cylinder it may be found by actual test to be the most desirable. The cylinder may be considered as a resonating chamber, and the proper position of the transmitter therein will depend upon the pitch of the sound received from the bell signal.

The transmitter may be easily focused to meet the conditions of any pitch, by merely increasing or decreasing the distance between the transmitter diaphragm and the hull of the ship. When the screen is not used, it will be preferable to position the transmitter as illustrated in Fig. 1, as by setting it back within the cylinder, in the absence of the screen, a whistling sound is likely to result, or if projected ever so slightly beyond the outer surface of the hull, the clearness of the signal would be impaired by the flow of the water against the transmitter. When it is desired to clean the transmitter, the thimble 12 is removed after opening the door 18 and turning it back upon the inclined portion of the casing, in which position it will remain under the action of its own weight. The piston may then be retracted to the limit of its inward movement, as shown in dotted outline in Fig. 1, after which the gate valve is lowered, cutting off the rear of the cylinder from the open sea, when the cylinder head may be detached and the piston removed. If the opening in the hull of the ship has become in any wise fouled, the piston may be replaced by a dummy piston or plunger, and the latter used after the cylinder head is placed in position and the valve opened, to force out the collected growth. In this way the transmitter may be kept in perfect order, and the apparatus will in no wise be rendered less efficient after long usage, if it is given the proper attention.

The apparatus, it will be observed, is not only rendered more efficient by presenting the transmitter directly to the sea, but this efficiency is augmented when the piston is forced to its seat, by reason of the close phonetic contact with the skin of the ship, which acts as a sound collector; and, under the circumstances, the cylinder will have an inexhaustible supply of water, and as a consequence the apparatus will not be rendered less effective by a portion of the water being lost through leakage or evaporation, which on the other hand would render an apparatus for this purpose inclosed within a tank practically useless.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:

1. The combination of a cylinder, a piston movable within the cylinder having a sound transmitter, and means intermediate the cylinder for cutting off communication between the opposite ends thereof.

2. The combination of a cylinder adapted to be secured within the hull of a ship in communication with the sea, a detachable head covering one end of the cylinder, and a piston having a stem slidable through said head and provided with a sound transmitter.

3. The combination of a cylinder having one end thereof open, a detachable head covering the opposite end of the cylinder, a piston movable in the cylinder, having a hollow head and provided with a hollow stem passing through said head, and a sound transmitter arranged within the hollow piston, having conductors passing therefrom through the hollow stem.

4. In combination with a ship having an opening in the hull thereof below the water line, a chamber secured within the ship in communication with said opening, and a piston movable in the chamber, adapted to seat in said opening and provided with a sound transmitter.

5. In combination with a ship having an opening in the hull thereof below the water line, a cylinder secured within the ship in communication with said opening, a head covering the inner end of the cylinder, a piston within the cylinder slidable through said head and provided with a sound transmitter, and means carried by the head of the cylinder for forcing the piston to said opening.

6. In combination with a ship having an opening in the hull thereof below the water line, a cylinder secured within the ship in communication with said opening, a sound transmitter within the cylinder movable to and from said opening, and means intermediate the cylinder for cutting off communication between its opposite ends.

7. The combination of a chamber, a sound transmitter within the chamber movable

longitudinally thereof, and means intermediate the length of the chamber for cutting off communication between its opposite ends.

5 8. The combination of a cylinder, a sound transmitter movable within the cylinder longitudinally thereof, and a gate valve movable transversely to the cylinder at an intermediate point thereof for cutting off the communication between the opposite
10 ends of the cylinder.

9. The combination of a cylinder having a detachable head, a piston within the cylinder slidable in said head, a sound transmitter
15 carried by the piston, and a valve for cutting off the communication between the opposite ends of the cylinder, with the piston between it and said head:

10. The combination of a cylinder having
20 a detachable head, a piston within the cylinder slidable in said head, a sound transmitter carried by the piston, a casing inclosing the cylinder, and a gate valve also inclosed by the casing for cutting off the communication between the opposite ends of the
25 cylinder and operable from the outside of the casing.

11. The combination of a ship having an opening in the hull thereof below the water
30 line, a cylinder secured within the hull over said opening, having a detachable head at its inner end, a piston within the cylinder slidable in said head, means for cutting off the communication between the opposite
35 ends of the cylinder, a sound transmitter

carried by the piston, and a casing covering the cylinder having a door providing access to the cylinder head.

12. In combination with a ship, a sound transmitter movable in, removable from and
40 exposable to the water through the walls of said ship, and means mounted adjacent said transmitter for preventing the inflow of water when said transmitter is removed while said ship is afloat.

13. A casing adapted to occupy a position
45 below the surface of a body of water and have an inlet through which the water is adapted to pass, said casing being otherwise water-tight, and a sound transmitter within
50 the casing, movable to and from said opening.

14. A casing having an inlet opening through which water is adapted to pass, said casing being otherwise water-tight, a
55 sound transmitter within the casing, and a valve for cutting off the water in the casing between said opening and the transmitter.

15. In combination with a ship, a sound transmitter exposable to the water without
60 the ship, and means preventing the inflow of water within the ship when said transmitter is removed.

In testimony whereof I have signed my name to this specification in the presence of
65 two subscribing witnesses.

CHARLES HOSKINS MUNDY.

Witnesses:

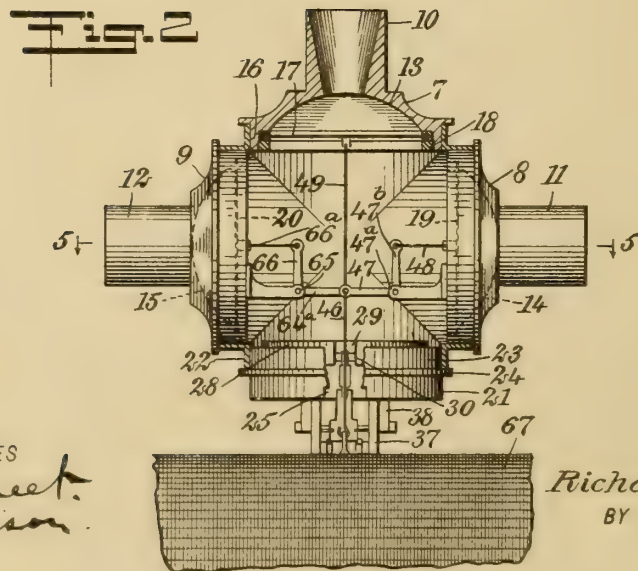
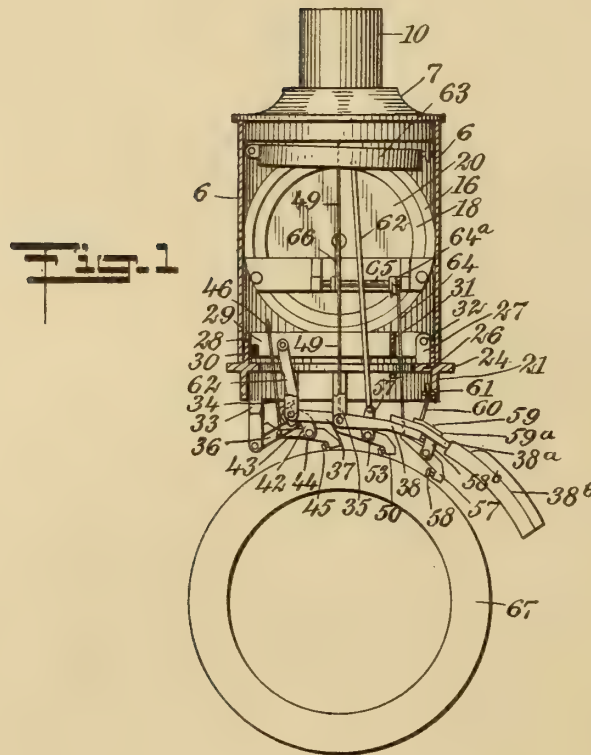
ELBRIDGE F. HILLS,
STACY R. HILLS.



908,897.

Patented Jan. 5, 1909.

2 SHEETS—SHEET 1.



WITNESSES

F. D. Sweet
W. Harrison

INVENTOR

Richard B. Smith
BY *Mumfords*
ATTORNEYS

908,897.

Patented Jan. 5, 1909.

2 SHEETS—SHEET 2.

Fig. 3

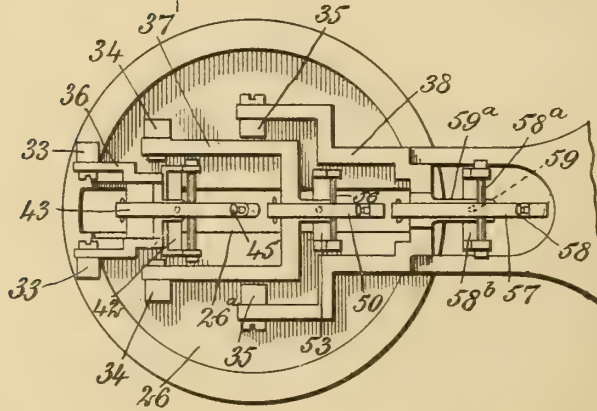


Fig. 4

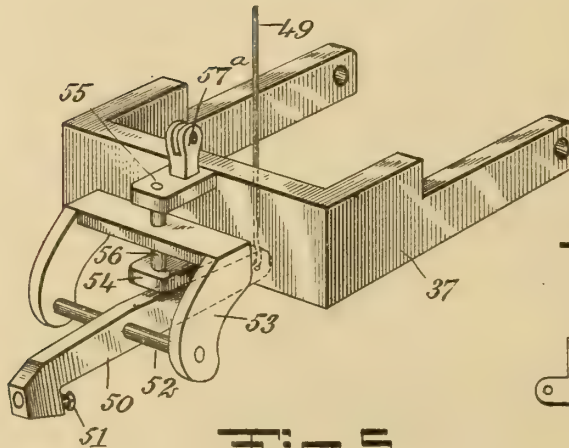


Fig. 5

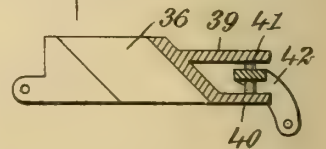
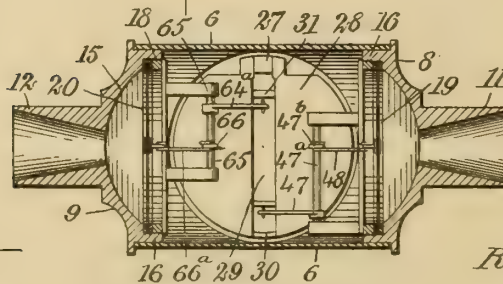


Fig. 6



WITNESSES
F. D. Sweet.
W. Harrison

INVENTOR
Richard B. Smith
BY *Mum Co.*
ATTORNEYS

UNITED STATES PATENT OFFICE.

RICHARD BARTHOLOMEW SMITH, OF NEW YORK, N. Y.

SOUND-REPRODUCER.

No. 908,897.

Specification of Letters Patent.

Patented Jan. 5, 1909.

Application filed October 1, 1908. Serial No. 455,776.

To all whom it may concern:

Be it known that I, RICHARD BARTHOLOMEW SMITH, a subject of the King of Great Britain, and a resident of the city of New York, borough of Manhattan, in the county and State of New York, have invented a new and Improved Sound-Reproducer, of which the following is a full, clear, and exact description.

My invention relates to sound reproducers used upon phonographs, and of the general type described in my Patent No. 799,418, dated September 12, 1905.

Among the objects sought to be accomplished by my present construction are the following: 1. to keep the stylus levers true in relation to the record grooves; 2. to mount the stylus levers upon universal joints, the axes of which are disposed in different planes crossing each other in a manner favorable for correct movements of the stylus levers; 3. a lessening of the friction of the stylus levers in their respective mountings; and 4. to simplify the construction and improve the general efficiency of the same.

Reference is to be had to the accompanying drawings forming a part of this specification, in which drawings like characters of reference indicate like parts throughout the views and in which—

Figure 1 is a view partly in side elevation and partly in section, showing the reproducer complete, as viewed from a point at the right of Fig. 2; Fig. 2 is a view partly in section and partly in elevation, showing the reproducer complete as seen from a point at the left of Fig. 1; Fig. 3 is an enlarged fragmentary inverted plan of the reproducer, showing the various stylus levers and their respective mountings; Fig. 4 is a perspective showing the middle stylus lever, the universal joint by aid of which the lever is mounted, and the swinging bracket by aid of which the universal joint and the middle lever are connected; Fig. 5 is a horizontal section upon the line 5-5 of Fig. 2 looking in the direction of the arrows, and showing internally the bottom of the casing together with the bottom weight, and means for connecting two of the diaphragms with the stylus levers associated respectively with them; and Fig. 6 is a longitudinal section through one of the swinging brackets provided with a fork used as a mounting for each of the stylus levers.

A casing is shown at 6, and is provided with sound domes 7, 8, 9, each having substantially the form of a cap provided internally with a concave face 13, 14 and 15. I find that by using these sound domes and giving them the form indicated there is less interference of the sound waves, and the quality of the sounds is greatly improved. The sound domes are provided with necks 10, 11 and 12, to which are to be secured branches leading to the sounding horns of the phonograph. Each sound dome is provided with a thin annular threaded portion 16, and encircled by these portions 16 respectively are the diaphragms 17, 19, 20, each held in position by aid of a threaded ring 18, as will be understood from Fig. 2. Disposed at the bottom of the casing 6 and detachably connected therewith is a ring 21 provided with a neck portion 23, which fits concentrically into the neck portion 22 of the casing. The ring 21 is provided with a flange 24 which normally abuts squarely against the lower edge of the neck 22, as will be understood from Fig. 2. The ring 21 is slightly cut away at 25 so as to make room for some of the parts, and is provided internally with a shelf 26 having a general annular form. Mounted upon this shelf is a bearing 27 attached to which is a weight 28. This weight in its entirety is in approximately circular form, but is provided with a slot 29 extending substantially across it, the two halves of the weight being simply held together by cross bars 30-31. A pivot 32 connects the weight 28 with the bearing 27 and allows it to swing slightly under proper conditions.

Mounted integrally upon the edge of the ring 21 and depending there below are two bearings 33, and mounted upon the shelf 26 and extending there below are two pairs of bearings 34, 35. Journaled within the respective pairs of bearings 33, 34 and 35 are swinging brackets 36, 37, 38, the bracket 36 being shown in detail in Fig. 6 and the bracket 37 in Fig. 4. The bracket 36 is provided with lugs 39-40 integral therewith, and extending therefrom. Journaled within these lugs is a stub shaft 41 and mounted upon the latter is a fork 42. A stylus lever 43 is mounted upon a stub shaft 44 which is journaled within the fork 42. The stylus lever 43 carries a stylus jewel 45, which may be of the usual or any preferred construction.

A rod 46 connects the free end of the stylus lever 43 with an arm 47. The latter is mounted rigidly upon a shaft 47^a, and extending upwardly from this shaft is another arm 47^b. A rod 48 connects the arm 47^b with the diaphragm 19. A rod 49 is connected with the diaphragm 17 and extends downwardly so as to engage the free end of the stylus lever 50. This stylus lever carries a stylus jewel 51, and is mounted upon a stub shaft 52, the latter being journaled within a fork 53. The swinging bracket 37 is provided with lugs 54, 55. Journaled within the latter is a stub shaft 56, which is rigidly connected to the fork 53 so as to turn therewith. As the construction of the brackets 36 and 38 does not vary greatly from that of the bracket 37, a good representative idea of each of these brackets may be obtained by inspection of the bracket 37 shown in Fig. 4.

It will be noted that the stub shaft 56 extends in a general direction crossing the length of the shaft 52, but that the shaft 52 is not in the same plane as the shaft 56. This is because the fork 53 extends at its bottom slightly to the left, according to Fig. 4. The ultimate purpose of this arrangement is to improve the quality of the sound, and also prevents the stylus needle 50 from jumping relatively to the record. With the parts arranged as here shown the sensitiveness of the entire construction is greatly improved. By thus placing the shafts 52 and 56 in different planes, the shaft 52 being intermediate the jewel 51 and the shaft 56, the stylus lever 50 appears to have greater freedom than when the parts are mounted otherwise. Hence the stylus lever has greater liberty to respond to vibratory influences exerted upon and through the jewel 51. I have also found that placing the shaft 52 in a different vertical plane from that of the shaft 56 reduces the friction of the stylus needle 50. This is probably due to the increased freedom given to the stylus needle. The mechanical principle here involved may be best understood by imagining that the fork 53 extends a considerable distance to the left according to Fig. 4. This much being assumed, it will be noted that a given movement of the outer or left hand portion of the fork relatively to the axis of the shaft 56 as a center turns this shaft a lesser distance than would be the case if the fork 53 was very short, so that the axis of the shaft 52 coincided with the general axial direction of the shaft 56. In other words, by extending the fork 53 to the left so as to remove the shaft 52 away from the shaft 56 I virtually locate the shaft 52 at the long end of the lever virtually journaled upon the axis of the shaft 56. This unquestionably gives more movement to the stylus lever 50 in a horizontal direction, and in doing this it likewise gives it more movement in a verti-

cal direction—that is, in a plane coinciding with the axis of the shaft 56. Any freedom of the stylus lever 50 which enables the jewel to follow a path of less resistance relatively to the record must have a tendency to increase the freedom of movement of the stylus lever in planes independent of that in which it receives its freedom initially. To state the same fact in a different way, freedom of movement given to the stylus lever in a horizontal plane enables the jewel to fit more accurately into the sound grooves, and in doing this the various elevations and depressions characteristic of the sound grooves are better able to exert their vibratory effect in a vertical direction.

Another stylus lever 57 is provided with a jewel 58, and is mounted upon a shaft 58^a, the latter being journaled in a fork 58^b. This fork is mounted upon a stub shaft 59, similar to the stub shaft 56, this stub shaft being journaled between lugs 59^a similar to the lugs 54, 55 in Fig. 4. The stylus lever 57 is, therefore, mounted, by aid of the universal joint, in substantially the manner already described with reference to the stylus lever 50. A plate 38^a is mounted rigidly upon the bracket 38, and carried upon this plate 38^a is a weight 38^b. A guide link 60 extends upwardly from the plate 38^a and engages a staple 61 for the purpose of preventing undue movement of the weight 38^b. A rod 62 is journaled in a head 57^a, see Figs. 1 and 4, and extends upwardly therefrom to a weight 63. This weight is of substantially the same construction as the weight 38^b above described, and by pressing downwardly upon the rod 62 the weight 63 presses the bracket 38 downwardly. A rod 64 is connected with the stylus lever 57 and extends upwardly therefrom, being journaled to an arm 64^a. This arm is mounted rigidly upon a rocking shaft 65. Extending upwardly from this rocking shaft is an arm 66 which is connected by a rod 66^a to the diaphragm 20. The record is shown at 67, and is engaged by three stylus needles which are disposed in tandem relatively to each other, as indicated relatively to Fig. 3, so that the various jewels carried by the stylus needles follow each other directly and in close succession in the groove.

The operation of my device may be readily understood from the foregoing description. The parts being adjusted and the record being given a rotary motion, the various jewels track behind each other in the sound groove of the record, the result being that the three diaphragms are actuated at practically the same instant so that the sounds are greatly amplified. The concave form given to the inner surfaces of the sound domes greatly improves the effect. With this apparatus an ordinary record may be played many times in succession without the jump-

ing of a single stylus lever. The wear upon the record is reduced to a minimum and every factor going to make up the general sound reproduced appears to be improved.

5 It will be noted that the necks 10, 11, 12 of the sound domes are located in a plane which crosses the general direction of travel of the record 67. This arrangement is of considerable value in practice for the reason that the
10 drag of the record upon the jewels carried by the stylus levers is equalized in such manner that all the diaphragms are affected substantially alike. That is to say, the vibrations impressed upon the various stylus levers are
15 so transmitted that neither diaphragm has any advantage over any other diaphragm in so far as one stylus lever being located ahead of another is concerned. For instance, as may be seen by comparing Figs. 2 and 5, the
20 direction of travel of the record 67 being crosswise of the general plane of vibration of all of the diaphragms can not cause any accidental dragging effect of the jewel upon the record to carry any diaphragm in the particular direction in which the record is travel-
25 ing or in the opposite direction. This is simply because the arms 47^b, 66 rock in planes which do not coincide with the plane representing the sound groove. Except for
30 this provision, the accidental dragging of the jewel within the sound groove at any particular moment might directly influence the motions of the diaphragms because of a tendency for the sound groove to carry the
35 stylus levers along with it as the record rotates.

In disposing the necks 10, 11, 12 in the same plane, I also accomplish another advantage, to wit, that the travel of the reproducer rela-
40 tively to the sound record is rendered much easier, the unavoidable strain exerted by the branches upon the necks 10, 11, 12, being better equalized and the tendency of the reproducer to skip parts of the record is there-
45 by greatly lessened.

In order to attain the practical advantages just stated, the arms 47, 64^a are staggered relatively to each other, as will be understood from Fig. 5, the arm 47 being located adja-
50 cent to one end of the shaft 47^a, whereas the arm 64^a is near the opposite end of the shaft 65. While this is the case, the rods 48, 66^a are in substantial alinement relatively to each other. This disposition of the parts en-
55 ables the arms 47, 64^a to be spaced apart far enough to allow for the proper spacing of the three stylus levers relatively to each other and for the distribution of these levers in a general plane crossing at right angles the
60 plane occupied by the three necks 10, 11, 12.

While I show as a representative form my device as applied to an ordinary cylinder phonograph, I do not limit myself in doing this, as the invention may be used in various
65 forms as the latter may suggest itself.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. In a talking machine, the combination of a plurality of brackets, one bracket being 70 wider than another so as to partially inclose the same, and a plurality of stylus needles mounted upon said brackets, said stylus needles being arranged in tandem for the purpose of following each other in a record 75 groove.

2. In a talking machine, the combination of a plurality of swinging brackets, a plurality of stylus levers, a universal joint connecting one of said stylus levers with one of said 80 brackets, each of said universal joints comprising two shafts occupying different planes for the purpose of increasing the freedom of movement of the stylus needle associated therewith, the several stylus needles being 85 arranged in tandem for the purpose of following each other in a record groove.

3. In a talking machine, the combination of a plurality of swinging brackets arranged in tandem relatively to each other, a fork 90 journaled upon each bracket and extending outwardly therefrom, a stylus lever journaled in each fork and free to rock in a plane coinciding with the axis of the revolution of said fork, the distance between the rocking 95 axes of the bracket being further from the axis of said bracket than the distance of the rocking axis from the fork associated with said bracket is from the rocking axis of said bracket, said stylus levers being arranged in 100 tandem for the purpose of following each other in a record groove.

4. In a talking machine, the combination of a revoluble sound record, a plurality of swinging brackets, a plurality of stylus le- 105 vers connected with said brackets and arranged in tandem to each other in a plane coinciding with the direction of travel of said revoluble sound record, and universal joints connecting said brackets with said stylus le- 110 vers for the purpose of increasing the independence of said stylus levers.

5. In a talking machine, the combination of a casing provided with a neck portion, a ring provided with a portion fitting detach- 115 ably into said neck portion, said ring being provided with bearings and with a flange for engaging said neck portion, brackets journaled upon said bearings, and stylus levers mounted upon said brackets. 120

6. The combination of a casing provided with a neck portion, a ring provided with a portion fitting into said neck portion and further provided with a flange engaging said neck portion and serving as a limiting stop 125 for said ring, stylus levers, and mechanism connecting said stylus levers with said ring.

7. The combination of a revoluble sound record, a casing disposed adjacent to said sound record and provided with a plurality 130

of necks disposed in a plane crossing the general direction of travel of said record, a plurality of diaphragms mounted within said casing, each diaphragm being disposed adjacent to one of said necks for the purpose of throwing sounds thereinto, a plurality of stylus levers, mechanism connected with said casing for supporting said stylus levers, and connections from said stylus levers to said diaphragms.

8. In a talking machine, the combination of a casing, a plurality of diaphragms mounted therein, a plurality of rocking shafts mounted within said casing, each rocking shaft being disposed adjacent to a particular diaphragm wherewith it is associated, a plurality of arms one mounted upon each shaft, a connection from each arm to the particular diaphragm adjacent thereto, another arm mounted upon each shaft but at a point spaced apart, along the axis of said shaft,

from the first mentioned arm located thereupon, and connected with a stylus lever.

9. The combination of a casing, diaphragms connected therewith, a plurality of rocking shafts mounted within said casing, a rocking arm connected rigidly with each rocking shaft, another rocking arm mounted upon each rocking shaft but spaced apart from said first-mentioned rocking arm in a general direction along the shaft, and connected with said diaphragms, and connections from said first-mentioned rocking arms to stylus levers.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

RICHARD BARTHOLOMEW SMITH.

Witnesses:

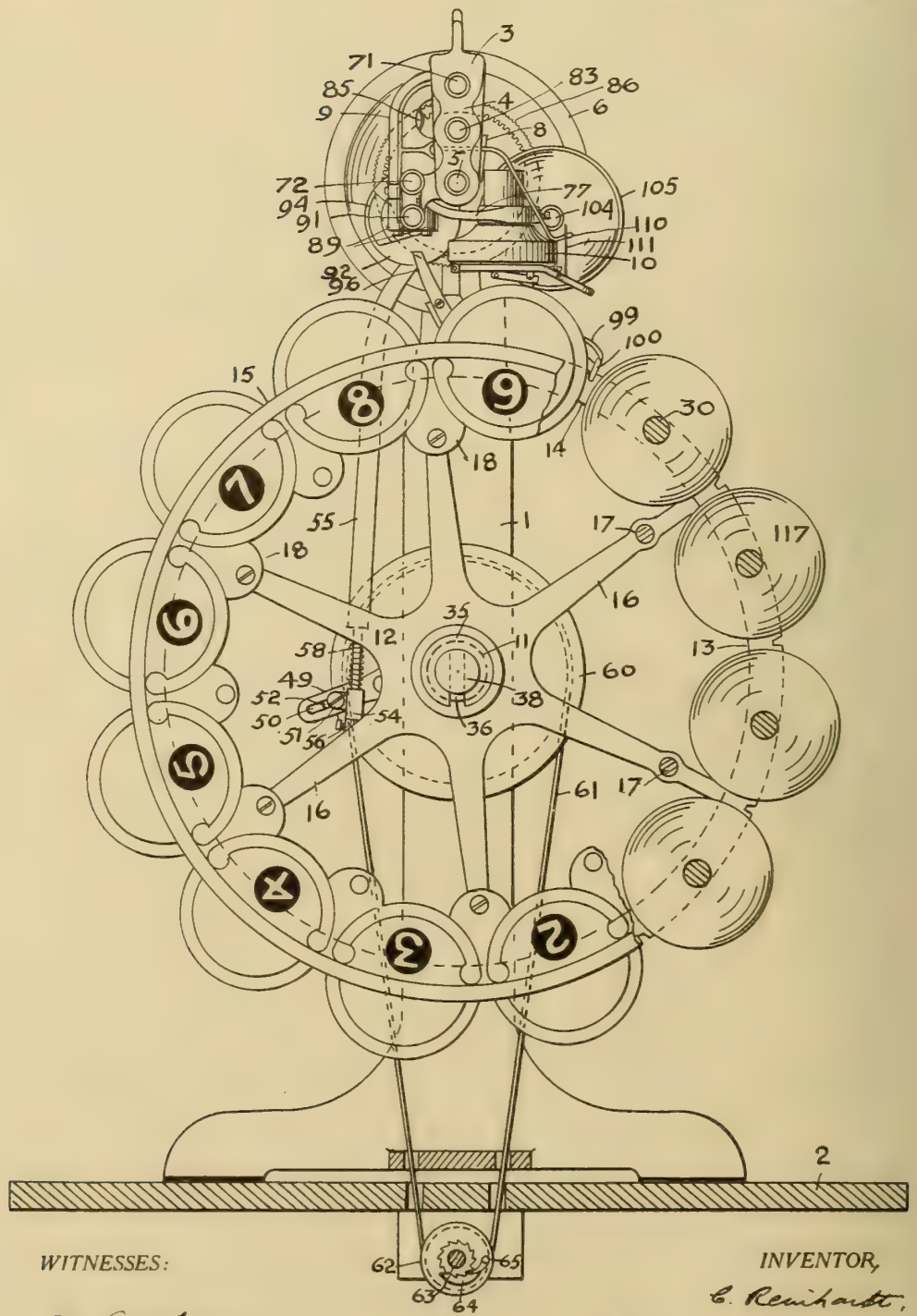
WALTON HARRISON,
EVERARD B. MARSHALL.



C. REINHARDT.
MAGAZINE PHONOGRAPH.
APPLICATION FILED DEC. 6, 1907.

909,455.

Patented Jan. 12, 1909.
6 SHEETS—SHEET 1.



WITNESSES:

M. Eastman
Leon Boillot

FIG. 1

INVENTOR,
C. Reinhardt,
BY *Jm. Wright,*
ATTORNEY.

909,455.

Patented Jan. 12, 1909.

5 SHEETS—SHEET 2.

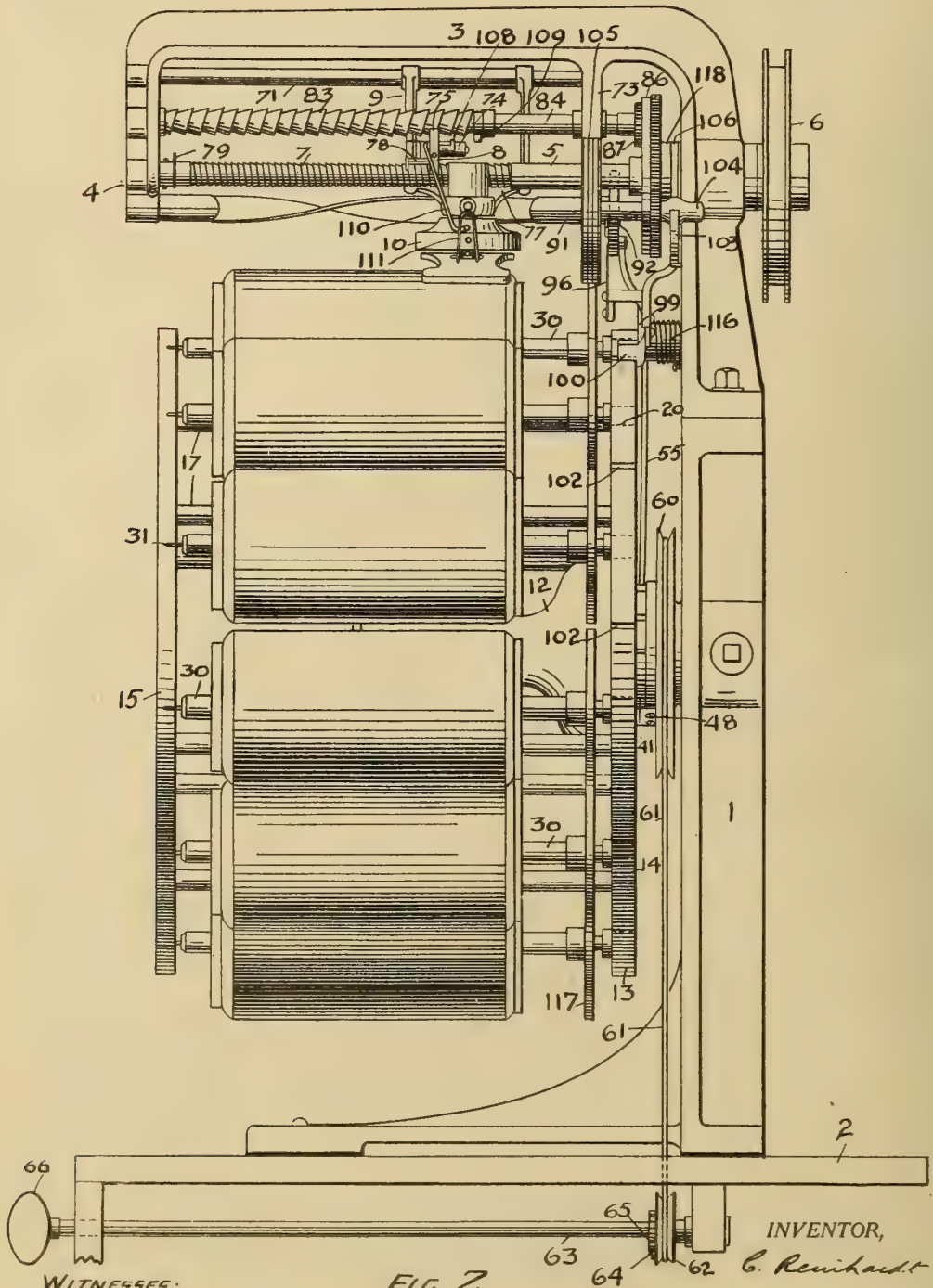


FIG. 2

WITNESSES:

M. Eastman

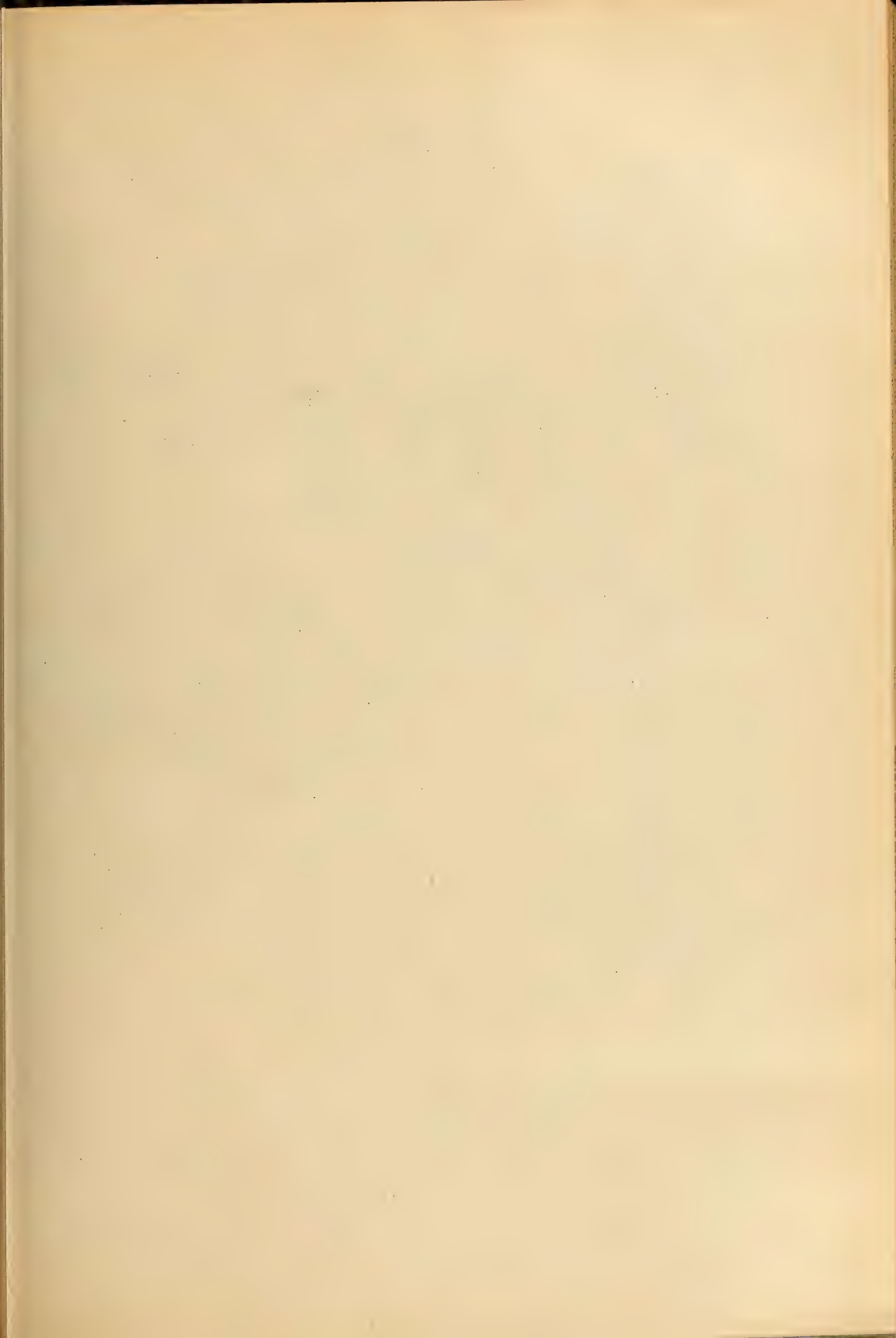
Leon Boillot

INVENTOR,

C. Reinhardt

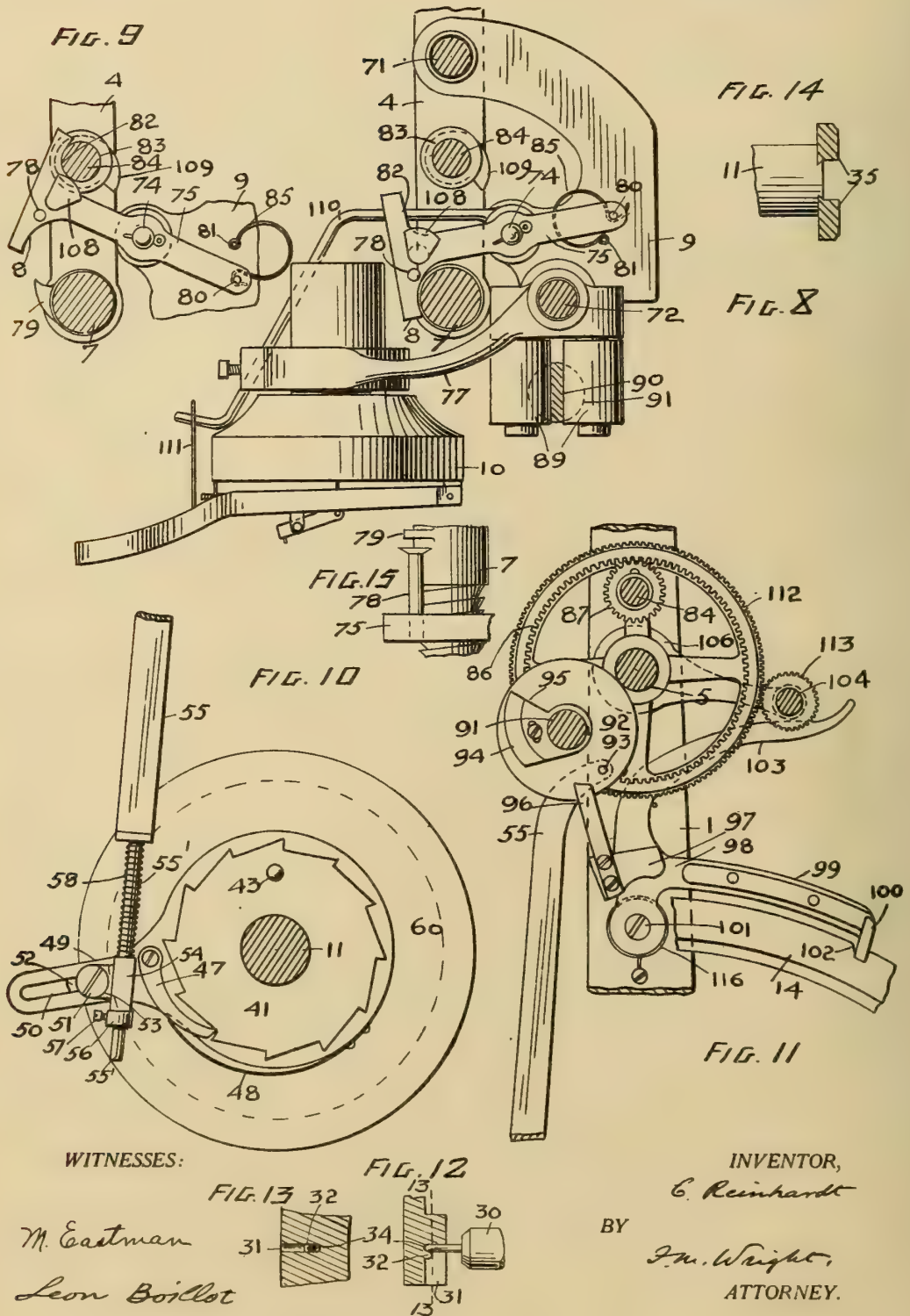
By J. M. Wright,

ATTORNEY.



909,455.

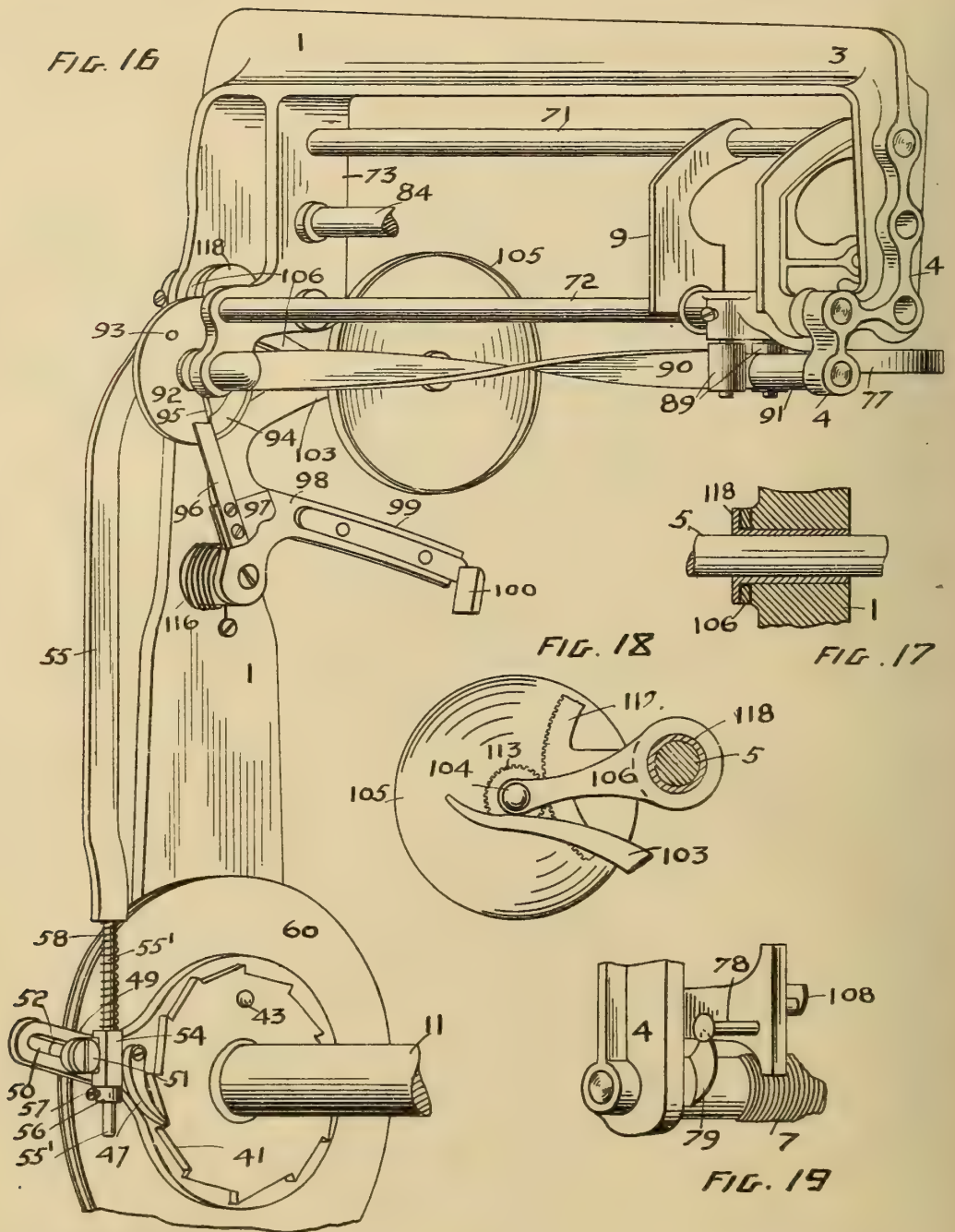
Patented Jan. 12, 1909.
6 SHEETS—SHEET 4.





909,455.

Patented Jan. 12, 1909.
5 SHEETS—SHEET 5.



WITNESSES:

M. Eastman
Leon Boillon

INVENTOR,
C. Reinhardt,
BY
J. M. Wright,
ATTORNEY.

UNITED STATES PATENT OFFICE.

CORNELIUS REINHARDT, OF SAN FRANCISCO, CALIFORNIA, ASSIGNOR TO THE AUTOPHONE COMPANY, OF SAN FRANCISCO, CALIFORNIA, A CORPORATION OF CALIFORNIA.

MAGAZINE-PHONOGRAPH.

No. 909,455.

Specification of Letters Patent.

Patented Jan. 12, 1909.

Application filed December 6, 1907. Serial No. 405,428.

To all whom it may concern:

Be it known that I, CORNELIUS REINHARDT, a citizen of the United States, residing at San Francisco, in the county of San Francisco and State of California, have invented new and useful Improvements in Magazine-Phonographs, of which the following is a specification.

The object of the present invention is to provide an apparatus whereby a considerable number of sound-reproducing cylinders may be arranged in such relation that any one of them may be rapidly brought into proper position for coöperation with the reproducer, or, if preferred, by which said cylinders may be so brought into such position in succession automatically.

In the accompanying drawing, Figure 1 is a broken front elevation of the machine; Fig. 2 is a side view thereof; Fig. 3 is an enlarged side view of the upper portion of the machine, the hub being shown in section; Fig. 4 is a broken detail side elevation of a lever actuated with the magazine feed; Fig. 5 is a broken view of a portion of said lever and parts coöperating therewith in a different position from that of Fig. 4; Fig. 6 is a detail sectional view showing a socket in the ratchet wheel; Fig. 7 is a detail sectional view showing a socket in a ring of the magazine wheel; Fig. 8 is an enlarged sectional view of the carriage; Fig. 9 is a view in a different position of parts shown in Fig. 8; Fig. 10 is a side view of the ratchet wheel for advancing the magazine and parts coöperating therewith; Fig. 11 is a view similar to Fig. 4, the parts being in a different position; Fig. 12 is a radial sectional view of one of the rings of the magazine wheel and a portion of a cylinder shaft; Fig. 13 is a sectional view on the line 13-13 of Fig. 12; Fig. 14 is a horizontal section through the end of the shaft carrying the hub of the magazine wheel; Fig. 15 is a detail sectional view of the device for changing the direction of movement of the carriage; Fig. 16 is a perspective view particularly illustrating the spiral ribbon shaft and its operative connection with the magazine wheel; Fig. 17 is a detail sectional view of the driving shaft; Fig. 18 is a cross sectional view of the same, showing a side view of the friction disk; Fig. 19 is a perspective view showing the raising of the lower nut by a cam.

Referring to the drawing, 1 indicates a standard or frame, adapted to be secured to any suitable support 2, such as a table or the top of a cabinet adapted to contain the records. The upper portion of said frame overhangs, as shown at 3, and has a downwardly depending outer end 4, and mounted in bearings in said end 4 and in the frame 3 is a shaft 5, which carries at its outer end a pulley 6 adapted to be driven by a belt from any suitable source of power, such as a spring or electric motor. The portion of said shaft remote from said frame is formed into the usual screw 7 for co-acting with the nut 8, which is carried with the carrier 9 carrying the reproducer 10. Extending from about the middle of said standard 1, is a stud shaft 11 upon which is rotatably mounted the sleeve or hub 12 of a wheel 13, comprising inner and outer rings 14, 15. The wheel is supported upon the hub by means of the inner ring 14 only, said ring being connected with said hub by spokes 16, while the outer ring 15 is supported from the inner ring by means of longitudinal bars 17 connecting lugs 18 on the outer ring with the spokes of the inner ring. This arrangement leaves the outer ring open and unobstructed in the center so that access is readily obtained by the hand to the hub of the magazine wheel 13, whereby said wheel can be readily and quickly removed from the shaft 11.

The sound-reproducing cylinders are supported in the wheel between the inner and outer rings in the following manner. The inner ring 14 has therethrough a series of round holes 20. Each hole 20 has at one end a reduced entrance forming an internal flange, or shoulder 21 and through said reduced entrance extends a plunger 22 having a flange 23 adapted to abut against said shoulder, and having a stem 24 which can slide through a central aperture in a screw 25 closing the rear end of the hole. A spring surrounds said stem 24, its rear end being received in a socket 28 in the screw 25 while its front end abuts against the rear side of the flange 23. Said plunger has a socket 27 to receive the end of a cylinder shaft. The construction of the stem of the plunger passing through a central aperture in the screw which closes the socket is of great importance in insuring that the cylinder is placed in proper position in reference

to the magazine wheel, which condition, again, is of importance for the proper reproduction of sound from the reproducer. An end of the shaft 30 of the cylinder carrier having been inserted in said socket 27 the other end of said shaft is passed into a radial groove 31 formed in the inner side of the other ring, and by depressing said plunger 22, said other end can pass over a transverse ridge 32 formed across said groove and drop into a socket 34 exactly opposite to a hole 20 in the inner ring. By means of the spring 26 the shaft 30 is automatically adjusted in its proper longitudinal position.

When the sleeve 12 of the magazine wheel has been placed upon the shaft 11, a forked washer 35 is passed down on the end of said shaft, so that sides of the fork engage the sides of a rib 36, (Fig. 14) formed on the end of said shaft, and said washer assumes a central position relative to said shaft. Then a screw 37 having a suitable milled head 38 is screwed inwards into the end of the shaft 11, the inner surface of the head entering a central recess 39 formed on the outer side of the washer 35, so that the inner side of the washer presses against the end of the central sleeve 12 of the magazine wheel. Thereby just the necessary friction can be applied to the magazine wheel to prevent it moving except when positively turned by the advancing mechanism, which will now be described. The inner end of said sleeve 12 abuts against the side of a ratchet wheel 41, having as many teeth as there are phonograph cylinders carried by the magazine wheel, twelve being here shown of each. It is by the operation of said ratchet wheel 41 that the magazine is intermittently rotated to bring each phonograph cylinder in succession into a proper position to reproduce the sound therefrom. In order to insure that the magazine is in proper relation to the ratchet wheel, so that when the ratchet wheel has been actuated a cylinder on said magazine will be in the exact position to co-operate with the reproducer, there is screwed into said ratchet wheel an axially directed cup 42 (Fig. 6) in which is a plunger 43 having a rounded protruding head, and pressed outwards by a spring 44. Said head is adapted to enter any one of two or more sockets 45 formed in the end of the magazine sleeve, and when it is in either of them, the magazine wheel will be found to be properly justified in relation to the ratchet wheel, so that a phonograph cylinder carried thereby will be in the proper position for the reproduction of sound therefrom. Said ratchet wheel is advanced intermittently to rotate the magazine wheel by means of a pawl 47, pressed inwards by a spring 48, and pivoted on an arm 49, rotatably mounted upon the shaft 11, said arm having

a radial slot 50, in which by means of a screw 51, is adjustably secured a slide piece 52 having a shaft 53 carrying pivotally mounted thereon a guide 54. Through said guide can slide the lower reduced end 55' of a pitman 55, the extreme lower end of said pitman, below said guide, having secured thereon a stop 56 secured by a set screw 57, a coiled spring 58 being interposed between said guide and the upper enlarged portion of said pitman. Hence, when the pitman is reciprocated, in the manner to be presently described, said movement of the pitman is transmitted to the arm and therefore also to the pawl, only through the medium of the spring, and a slight play, or lost motion of the pitman relatively to the pawl is thus permitted, so that should the magazine wheel be locked by the locking mechanism hereinafter described, when the pitman is still being reciprocated, the movement of the pitman will be taken up by the spring.

To turn the magazine wheel independently of the above mechanism, so as to set it to any desired position, and bring any desired cylinder into operation, there is provided a pulley 60 secured upon the shaft 11 of the magazine wheel, and driven by a belt 61, and a pulley 62 loose on a shaft 63 (Figs. 1, 2) on which shaft is secured a ratchet wheel 64 adapted to be engaged by a pawl 65 on the pulley 62. A handle 66 is provided at the front or outer end of the shaft 63 for turning said shaft. By this arrangement, when the magazine wheel is turned by means of the ratchet wheel 41 and pawl 47, the ratchet wheel 64 can freely pass under the pawl 65 and when the shaft 63 is turned in the proper direction the ratchet wheel 64 will engage the pawl 65 to turn the pulley to bring the magazine wheel into any desired position, the ratchet wheel 41 then passing freely under the pawl 47.

The carriage 9 of the reproducer slides upon the usual upper and lower guide rods 71 and 72 which are secured to a depending arm 73 of the frame and to the depending outer end 4 thereof. From the outer side bar of the frame of said carriage 9 extends laterally inwards a stud shaft 74, upon which is pivoted a lever 75, the front end of which lever carries the half-nut 8, which engages the feed screw, 7, so that, by the rotation of the said feed screw, the carriage moves longitudinally upon said guide rods. From the carriage 9 extends, below said feed screw, the arm 77 which carries the reproducer 10, and from the outer side of the front end of the lever 75 extends a stud 78 having an enlarged flattened head (Fig. 15). When the carriage arrives at the end of said feed screw, a cam 79 (Fig. 9) secured to said feed screw and rotating therewith engages said stud 78, and thereby raises the front end of said lever arm. Said

front arm of the lever is normally held down, so that said nut engages said feed screw, by means of a bow spring 85, one end of which engages a pin 80 secured at the rear end of the lever, while its other end engages a pin 81 extending inwards from the outer side of the carriage frame. This spring acts as an overbalance, for it is double acting, that is, it acts to throw the lever into one of two positions, on opposite sides of its central position of unstable equilibrium, in the one position to hold up the rear end of the lever and hold down its front end and the nut 8 carried thereby, and when the front arm of the lever has been raised by the cam 79, so that the pin 80 carried by the rear end of the lever has just passed the dead center of the lever, then the spring acts to move the rear end of the lever down to its other limiting position, and thereby raises its front end. The front end of the lever is formed not only on its lower side with the half-nut 88, but on its upper side with a lug or half-nut 82 to engage a return screw 83, the threads of the latter screw being of much greater width than those of the feed screw, and in a reverse direction so that, by the rotation of said return screw and the engagement of the upper nut therewith, the carriage returns to its original position. Said return screw is on a shaft 84 pivoted in bearings in the arm 73 and in the depending end of the frame, which shaft carries on its inner end a pinion 87 which meshes with an internal gear wheel 86 on the main shaft 5, whereby said return screw 83 is rotated in unison with the feed screw 7. At the same time that the lower nut is raised from the feed screw, a spring arm 110 extending from the carrier, and the outer end of which engages a yoke 111 carried by the reproducer, raises said reproducer, so that the point of the reproducer is moved out of engagement with the cylinder, thus performing the same function as is done by hand in lifting the reproducer at the end of the music in the ordinary method of using the phonograph. When the lower nut is again lowered on the cylinder, the reproducer is also lowered to re-commence the music or other sound reproduction.

From the carrier 9 depend two shafts carrying rollers 89 which engage opposite sides of a spiral ribbon 90 on a shaft 91 having bearings in the end 4 and the arm 73. As the carrier 9 travels, the rollers 89, engaging the spiral ribbon 90, impart a slow rotation thereto and to the shaft 91, the direction of said rotation depending upon the direction of movement of the carriage. Upon said shaft 91 is secured a disk 92, to a wrist pin 93 on which is pivoted the upper end of the pitman 55, and thus it is by the rocking of the shaft 91 that the before-

mentioned reciprocating movement is imparted to said pitman. Upon the face of the disk 92 is secured a surface cam 94 having a surface gradually rising from the surface of the disk, but having an abrupt rear edge 95. As the disk rocks in the direction due to the movement of the spiral ribbon of the shaft 91 caused by the advance of the carriage by the feed screw, there rides upon said surface cam 94 the wide side of a spring arm 96 carried upon an arm 97 of a lever 98, pivoted at 101 on the frame of the machine. When the carriage reaches the end of its forward advance, the disk has turned to such an extent that said spring arm 96 passes over the rear end 95 of the surface cam, and springs back into contact with the surface of the disk, behind the abrupt end 95 of said cam. Then, when said disk begins to rotate in the other direction, due to the return movement of the carriage, and the consequent reverse rotation of the spiral ribbon shaft, the narrow edge of the spring arm 96 is engaged by the abrupt end 95 of the surface cam, and moved back so as to rock the lever 98 against a spring 116. Said lever 98 has an arm 99 extending from the pivot 101 on the opposite direction to the arm 96 and has a finger 100 at its end, which finger rides on the periphery of the ring 14 of the magazine wheel as the latter rotates, but when said wheel has rotated through the angle corresponding to the distance from one cylinder to the next, said finger can, if the spring arm 96 is released by the cam 94, drop into one of a series of notches 102 formed in the periphery of said ring 14 and lock the same in the exact position so that a cylinder of the magazine can cooperate with the reproducer. One of the first effects, therefore, of the commencement of the return of the carriage is, by means of the arm 96 actuated by the cam 94, to raise the finger 100 out of a notch 102 in the rotating ring 14 so that the magazine wheel is free to move. Another arm 103 of said lever 98 engages the shaft 104 of a friction wheel 105 having its bearings in the end of an arm 106 swinging on a bushing 118 on the shaft 5, and raises said friction wheel, while maintaining the shaft 104 parallel to its operative direction. Said friction wheel is employed to rotate the sound-reproducing cylinder and does this by frictional contact with the periphery of a disk 117, it being itself rotated by means of a pinion on the shaft 9. By the construction just described, before the magazine wheel begins to rotate, said friction wheel 105 is raised from off the disk 117. Both of these effects take place immediately on the return movement of the carriage, although the magazine wheel does not begin to rotate immediately upon said return movement, for the reason

that the upper end of the pitman 55 is at this time at the dead center point of the movement of the disk, so that the disk can turn through a considerable distance with the return of the carriage without reciprocating said pitman to any appreciable extent. The continued movement of the rollers 89 along the spiral ribbon in the return movement of the carriage causes the disk 92 to rotate so that the pawl 47, engaging a tooth of the ratchet wheel 41, advances said ratchet wheel, and turns the magazine wheel to a position in which another cylinder has been brought into position for sound reproduction. When the upper nut 82 arrives at the inner end of the return screw, a lug 108 extending from the advancing side of said nut is engaged by a cam 109 on said return screw to depress said nut and the lever carrying the same past the dead center of the spring 85, so that said spring 85 now throws the lower nut into engagement with the feed screw, and the reproducer travels along the cylinder.

The construction, whereby the friction wheel 105 is lifted from off the disk 117 which it rotates, without changing the inclination of its shaft 104 constitutes an important improvement. In prior constructions, this friction wheel has been carried by a pivoted shaft extending transversely to the disk 117, said shaft also carrying the pinion 113, and, since this shaft was lifted by swinging it, it was necessary, in order to permit of the friction wheel 105 being raised, that the teeth of the pinion 113 should loosely engage the teeth of the gear wheel 112 so as to allow for the slight change in direction of said teeth when the friction wheel 105 was so raised. This was very objectionable, because the improper position of the teeth of the gear wheel and pinion relative to each other entailed too great an expenditure of power in driving the pinion, and moreover created a disagreeable noise, the latter being very objectionable in a machine of this character. By my present improvement the shaft 104 maintains its direction parallel to itself, so that, while being raised the teeth of the pinion maintain their proper positions relative to the teeth of the gear wheel, and the above objections are avoided.

I claim:—

1. In an apparatus of the character described, the combination of a wheel for carrying sound-reproducing cylinders, comprising two side rings rigidly connected together, said rings having each a circular series of sockets, a spring-pressed plunger in each socket of one of said series, a reproducer, a carriage therefor, arranged to cooperate with a cylinder of the series, and means automatically actuated by the movement of the carriage to a predetermined po-

sition to rotate said wheel through the distance between two successive sockets of a series, substantially as described.

2. In an apparatus of the character described, the combination of a wheel adapted to carry a plurality of sound-reproducing cylinders, a side of said wheel having a series of sockets, each having circular shoulders, a plunger in each socket having a circular flange adapted to engage with the shoulder thereof, and a reduced stem behind said flange, a screw screwed into the outer end of the socket and having a central aperture, said reduced stem passing through said aperture, and a spring between said flange and screw, substantially as described.

3. In an apparatus of the character described, the combination of a magazine wheel comprising inner and outer rings and a central hub, spokes connecting the inner ring only to the hub, shafts extending between said inner and outer rings for supporting sound reproducing cylinders and a circular series of independent longitudinal bars rigidly connecting the inner and outer rings, the outer ring being open and unobstructed in the center, substantially as described.

4. In an apparatus of the character described, the combination of a frame, a shaft extending at right angles therefrom, a sleeve on said shaft, a magazine wheel rigidly connected to said sleeve, a screw screwed on the end of the shaft and having an enlarged head, said end of the shaft having parallel transverse shoulders, and a forked washer passing over said shaft in contact with said shoulders, the head of the screw being adapted to engage the side of the washer to force the same against the end of the sleeve, substantially as described.

5. In an apparatus of the character described, the combination of a frame, a shaft extending therefrom and supported wholly at its inner end upon said frame, a magazine wheel having a central sleeve on said shaft and secured to said sleeve wholly at the inner side of said wheel, the outer side of the wheel being supported wholly upon the inner side and unobstructed at the center to allow free access to the outer end of said shaft, and means detachably secured direct to the outer end of said shaft for securing said sleeve thereon, substantially as described.

6. In an apparatus of the character described, the combination of a frame, a shaft extending therefrom and supported wholly at its inner end upon said frame, a magazine wheel having a central sleeve on said shaft, and secured to said sleeve wholly at the inner side of said sleeve, the outer side of the wheel being supported wholly upon the inner side and unobstructed at the center to allow free access to the end of said shaft,

and a transversely movable locking device secured to the outer end of said shaft for securing said sleeve thereon, substantially as described.

5 7. In an apparatus of the character described, the combination of a magazine wheel, a wheel for rotating said magazine wheel, one of said wheels having a spring-actuated protruding pin, and the other wheel having a socketed disk against the face of which said pin is adapted to travel said socket being adapted to be engaged by said pin to justify the position of said magazine wheel relative to said intermittingly rotating wheel, and means for rotating the latter wheel, substantially as described.

8. In an apparatus of the character described, the combination of a magazine wheel adapted to carry a plurality of sound-reproducing cylinders, a ratchet wheel arranged co-axial with the magazine wheel and adjacent thereto, a sound reproducer co-operating with one of said cylinders, a carriage for said reproducer, means for guiding said carriage in operative relation with said latter cylinder, means automatically reciprocated by the movement of said carriage and adapted to engage said ratchet wheel to turn said magazine wheel, and means whereby said ratchet wheel and magazine wheel are detachably connected to rotate as a single body, substantially as described.

9. In an apparatus of the character described, the combination of a magazine wheel adapted to carry a plurality of sound-reproducing cylinders, a ratchet wheel, a sound reproducer co-operating with one of said cylinders, a carriage for said reproducer, means for guiding said carriage in operative relation with said latter cylinder, means automatically reciprocated by the movement of said carriage and adapted to engage said ratchet wheel to turn said magazine wheel, said means including a spring through which the power is transmitted, and adapted to take up lost motion in the power-transmitting means, and means whereby said ratchet wheel and magazine wheel are detachably connected to rotate in unison, substantially as described.

10. In an apparatus of the character described, the combination of a magazine wheel arranged to carry a plurality of reproducing cylinders, a reproducer arranged to co-operate with one of said cylinders, a carriage therefor, a guide for said carriage, and means automatically reciprocated by the return movement of said carriage to advance said magazine wheel, said means comprising a spring through which the power is transmitted, substantially as described.

11. In an apparatus of the character described, the combination of a sound-repro-

ducing cylinder, a reproducer, a carriage 65 for the reproducer, a feed screw for said carriage, a return screw, nuts carried by said carriage, and adapted to engage respectively the feed and return screws, and means automatically actuated by the movement of the carriage on arriving at a predetermined point to remove from the feed screw the corresponding nut, and to cause the other nut to engage the return screw, said means comprising a double-acting spring arranged to move said carriage from a mediate position of unstable equilibrium to either of two limiting positions, substantially as described.

12. In an apparatus of the character described, the combination of a sound-reproducing cylinder, a reproducer, a carriage therefor, a feed screw, a return screw, nuts carried by said carriage and adapted to engage respectively the feed and return screws, each screw having a cam formed thereon adapted in the rotation of said screw to engage a part of said carriage to move said part so that one nut leaves its screw and the other nut moves towards the other screw, and an overbalance device arranged to complete said movement when so commenced by either cam substantially as described.

13. In an apparatus of the character described, the combination of a sound-reproducing cylinder, a reproducer, a carriage 95 therefor, a feed screw, a return screw, nuts carried by said carriage and adapted to engage respectively the feed and return screws, each screw having a cam formed thereon adapted in the rotation of said screw to engage a part of said carriage to move said part so that one nut leaves its screw and the other nut moves towards the other screw, and a double acting spring for assisting said movement, substantially as described.

14. In an apparatus of the character described, the combination of a sound reproducing cylinder, a reproducer, a carriage therefor, a guide for said carriage, on which it is reciprocated, and means for deriving a rotary movement from the longitudinal movement of the carriage, comprising a pair of roller shafts extending from the carriage, rollers thereon, and a spiral shaft, passing between said rollers, whereby the longitudinal movement of the carriage turns said shaft, substantially as described.

15. In an apparatus of the character described, the combination of a magazine wheel, arranged to carry a plurality of sound-reproducing cylinders, a reproducer, a carriage therefor, a guide for said carriage, a shaft having a spiral surface thereon, of a sufficiently high pitch to cause said shaft to be turned by the movement, in a direction parallel with the axis of the shaft, of a part engaging said spiral surface and means carried by the carriage engaging said

spiral surface, whereby the longitudinal movement of the carriage turns said shaft, substantially as described.

16. In an apparatus of the character described, the combination of a magazine wheel, arranged to carry a plurality of sound-reproducing cylinders, a reproducer, a carriage therefor, a guide for said carriage, parallel shafts supported by said carriage, rollers on said shafts, a spiral shaft, passing between said rollers, whereby the longitudinal movement of the carriage turns said shaft, and an operative connection between said shaft and the magazine wheel, whereby said magazine wheel is rotated by the rotation of said shaft, substantially as described.

17. In an apparatus of the character described, the combination of a magazine wheel, arranged to carry a plurality of sound-reproducing cylinders, a reproducer, a carriage therefor, a guide for said carriage, parallel shafts supported by said carriage, rollers on said shafts, a spiral shaft passing between said rollers, whereby the longitudinal movement of the carriage turns said shaft, a disk on said shaft, a pitman connected to said disk, a ratchet wheel arranged to rotate in unison with the magazine wheel, a pawl engaging said ratchet wheel, and an operative connection between said pitman and pawl, substantially as described.

18. In a magazine phonograph, the combination, with a magazine wheel, arranged to support phonograph cylinders, of a friction wheel for rotating a cylinder thereon, said magazine wheel having a series of notches corresponding to the several positions of the cylinders on the wheel, a lever having a finger to selectively engage one of

said notches, a reproducer carriage and a support upon which said carriage travels in proper relation to the sound-reproducing cylinder, and means automatically actuated by the return movement of the carriage to first raise said friction wheel out of operative connection with said cylinder and to raise said finger out of the notch engaged thereby, and then to positively advance said magazine wheel, substantially as described.

19. In a magazine phonograph, the combination with a magazine wheel arranged to support phonograph cylinders, of a friction wheel for rotating a cylinder thereon, a shaft for said friction wheel, means for rotating said shaft, and means for raising said shaft to remove said friction wheel from operative engagement, and means for maintaining said shaft in a direction parallel to its operative direction while so raising said shaft, substantially as described.

20. In a magazine phonograph, the combination with a magazine wheel arranged to support phonograph cylinders, of a friction wheel for rotating a cylinder thereon, a shaft for said wheel, a gear wheel on said shaft, a second gear wheel meshing with said gear wheel, means for rotating the second gear wheel, and means for raising said shaft to remove said friction wheel from operative engagement, and means for maintaining said shaft parallel with its operative direction while so raising said shaft, substantially as described.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

CORNELIUS REINHARDT.

Witnesses:

FRANCIS M. WRIGHT,
D. B. RICHARDS.

H. SCHRÖDER.
 PHONOGRAPH RECORD.
 APPLICATION FILED APR. 4, 1908.

909,461.

Patented Jan. 12, 1909.

Fig. 1.

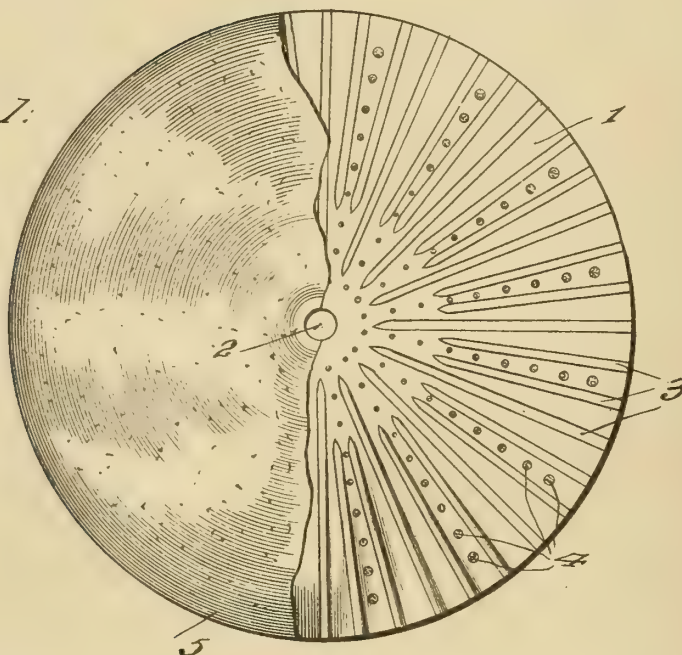


Fig. 2.



Fig. 3.



H. Schröder. ^{Inventor}

Witnesses
C. Phillips
F. V. Hillyard.

By *Th. H. H. H.* Attorneys

UNITED STATES PATENT OFFICE.

HERMANN SCHRÖDER, OF NEW YORK, N. Y.

PHONOGRAPH-RECORD.

No. 909,461.

Specification of Letters Patent.

Patented Jan. 12, 1909.

Application filed April 4, 1908. Serial No. 425,266.

To all whom it may concern:

Be it known that I, HERMANN SCHRÖDER, citizen of the United States, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Phonograph-Records, of which the following is a specification.

This invention comprehends certain new and useful improvements in record disks for phonographs, and the invention has for its object an improved construction of record disk which may be cheaply manufactured and which will be light and yet stiff or rigid and capable of resisting hard use without breaking.

With this and other objects in view, the invention consists in certain constructions, arrangements and combinations of the parts that will be hereinafter fully described and then claimed.

For a full understanding of the invention, reference is to be had to the following description and accompanying drawings, in which:

Figure 1 is a top plan view, partly broken away, of a phonograph record embodying the improvements of my invention; Fig. 2 is a transverse sectional view thereof; and, Fig. 3 is a sectional view.

Corresponding and like parts are referred to in the following description and indicated in all the views of the drawings by the same reference characters.

In carrying out my invention, I employ a foundation plate 1 of any desired size, according to the record that is performed, said plate being constructed of relatively thin sheet metal and being disk-like or circular, as shown and formed with the usual center opening 2. The foundation plate 1 is formed with a series of radially extending corrugations 3 which begin at the margin of the plate and terminate short of the center thereof, said corrugations serving to stiffen the plate and permitting a relatively light stock to be used. In addition to the corrugations 3, the plate 1 contains a plurality of radially extending rows of perforations 4 serving as bonding openings for the plastic composition 5 forming the body portion or surface of the disk, the said plate 1 being embedded in said composition and the latter

extending through all of the perforations, as clearly illustrated in the drawing.

From the foregoing description in connection with the accompanying drawing, it will be seen that I have provided a very simple and durable construction of record disk for phonographs, which may be very cheaply made, the foundation plate 1 being of relatively light sheet metal stiffened by the corrugations 3, and firmly embedded in the plastic composition of the disk, such composition being anchored securely to the plate by means of the perforations 4 and the composition passing therethrough, the whole forming a record disk that is light and yet stiff or rigid and capable of withstanding hard use.

It is to be understood that the body portion of the disk in which the plate 1 is embedded may be of any desired composition, either for soft or hard records.

It is also to be understood that with this improved record, a stone is to be used instead of a needle and that the grooves are so arranged that the stone will start at the center of the record and run to the outer edge thereof instead of from the outer edge to the center.

Having thus described the invention, what is claimed as new is:

1. A record disk of the character described, embodying a body portion and a foundation plate embedded therein, said plate being formed with a series of radially extending corrugations.

2. As a new article of manufacture, a foundation plate for record disks formed with radial corrugations and radially extending series of perforations.

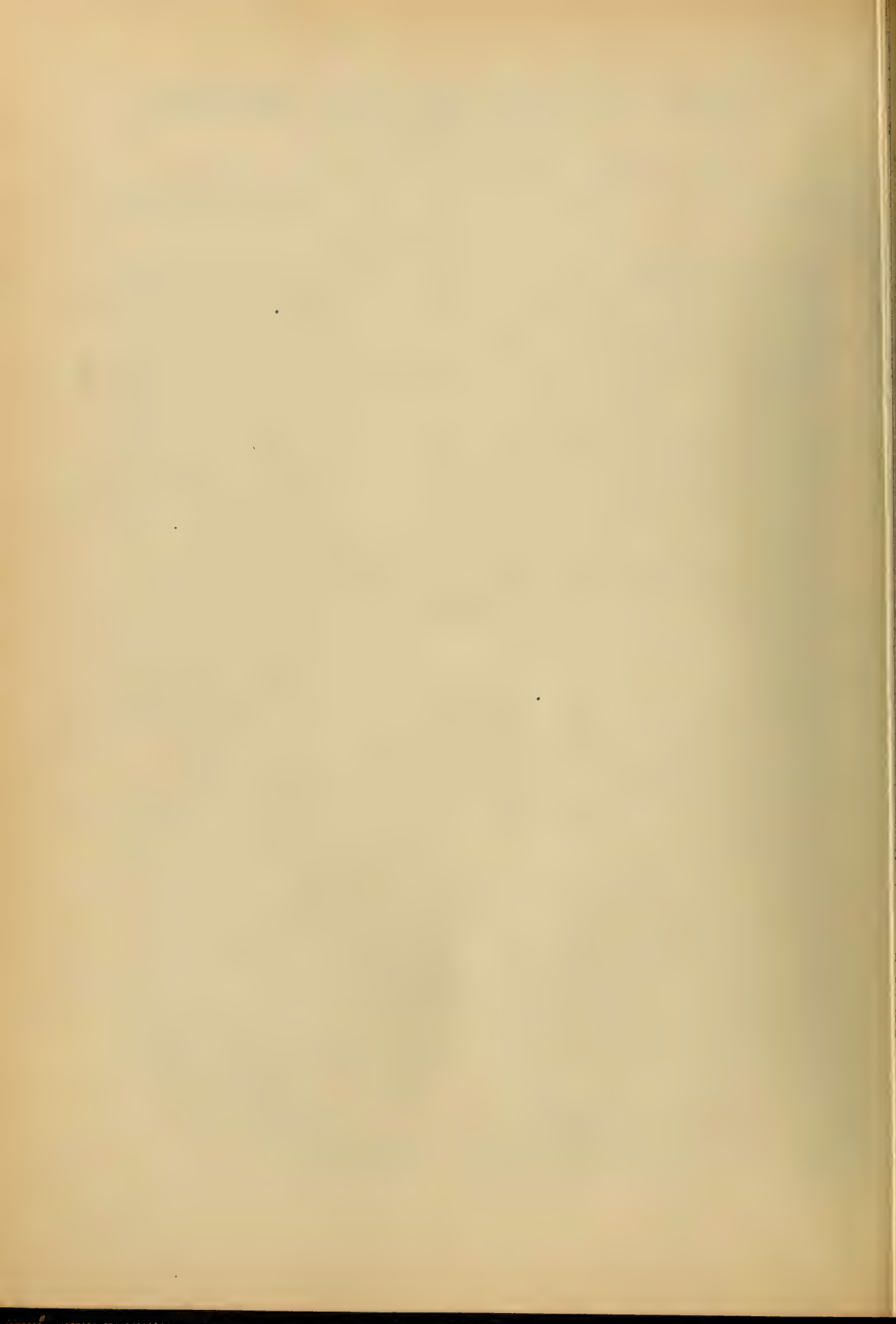
3. A record disk of the character described, embodying a body portion and a foundation plate embedded therein, said plate being provided with perforations through which the composition of which the body portion is formed passes, said plate being also formed with radial corrugations.

In testimony whereof I affix my signature in presence of two witnesses.

HERMANN SCHRÖDER. [L. S.]

Witnesses:

MALWINE VON DER OSTEN,
CORA WIELAND.



W. H. McCURDY.
SOUND REPRODUCING INSTRUMENT.
APPLICATION FILED JAN. 24, 1908.

909,645.

Patented Jan. 12, 1909.
3 SHEETS—SHEET 1.

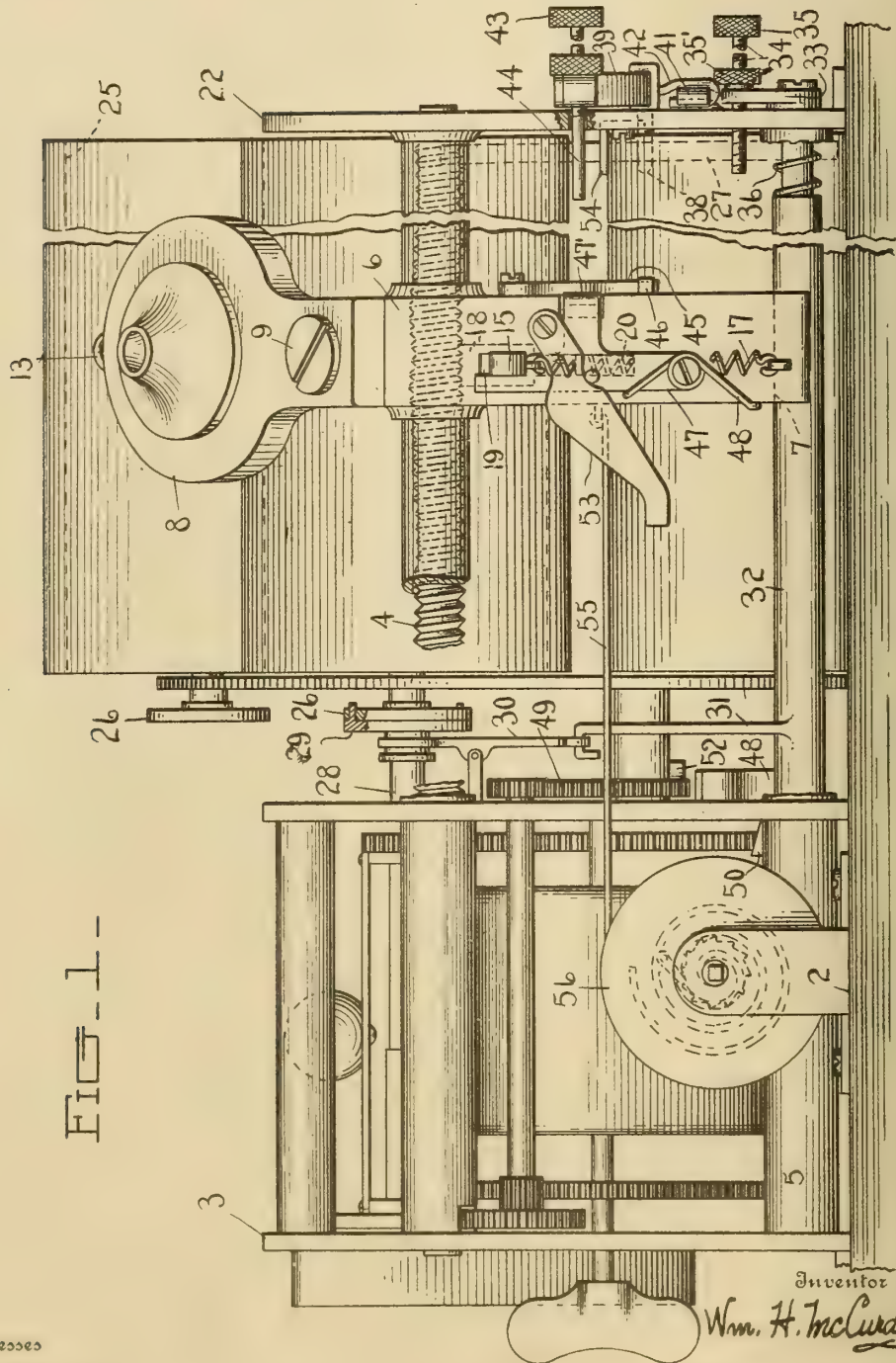


FIG. 1-

Witnesses

L. B. James
A. O. Barber

Inventor

Wm. H. McCurdy

By

Francis R. Erney

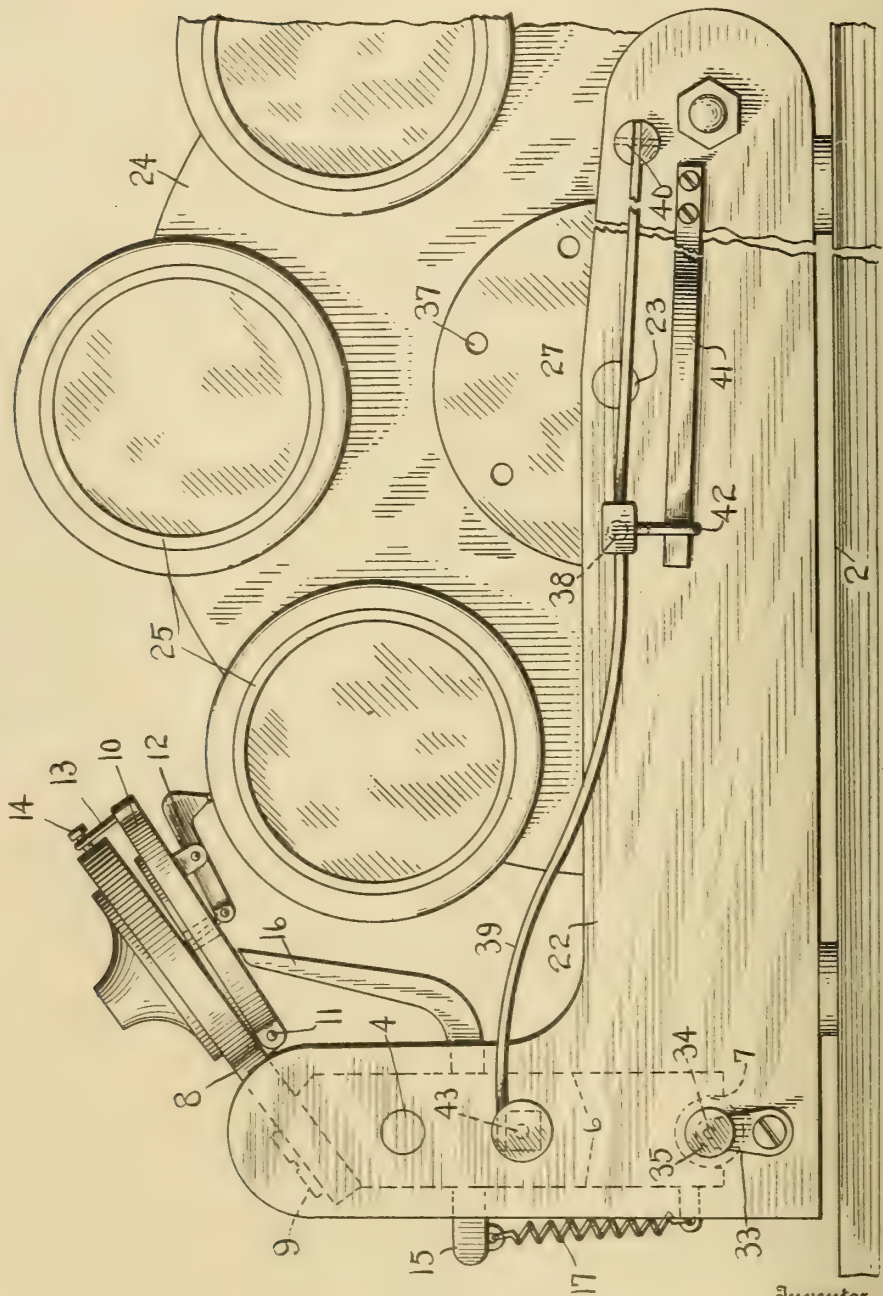
Attorney

W. H. McCURDY.
SOUND REPRODUCING INSTRUMENT.
APPLICATION FILED JAN. 24, 1908.

Patented Jan. 12, 1909.
3 SHEETS—SHEET 2.

909,645.

FIG. 2—



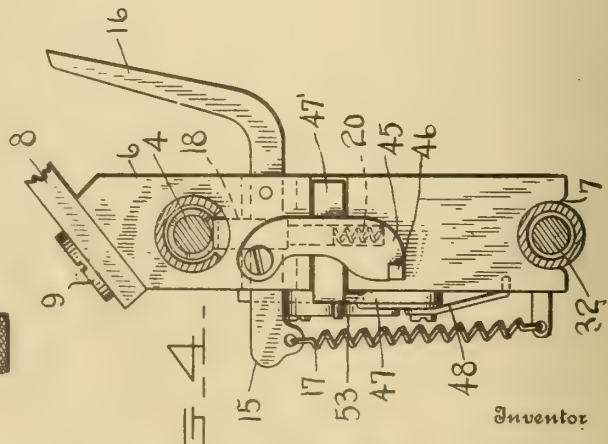
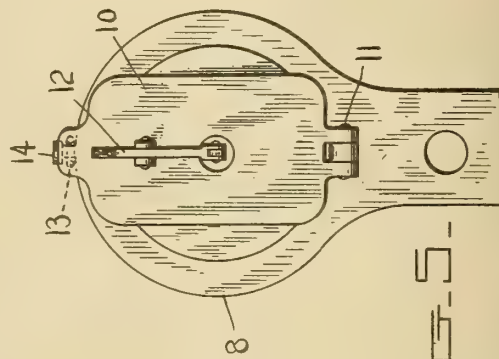
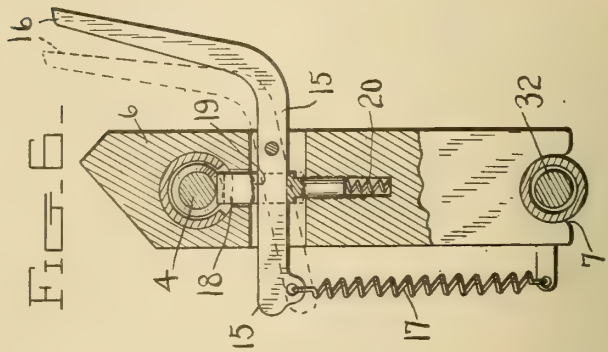
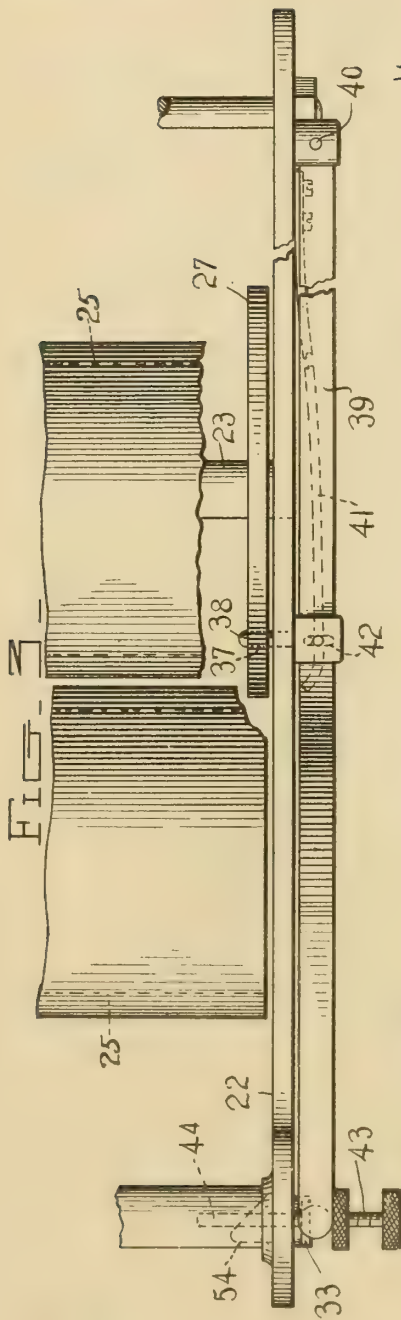
Witnesses
L. B. James
H. O. Darrow

Inventor
Wm. H. McCurdy
By Francis P. Erney
Attorney

W. H. McCURDY.
SOUND REPRODUCING INSTRUMENT.
APPLICATION FILED JAN. 24, 1908.

Patented Jan. 12, 1909.
3 SHEETS—SHEET 3.

909,645.



Witnesses
L. B. James
H. O. Darden

Inventor
Wm. H. McCurdy
By Francis R. Erney
Attorney

UNITED STATES PATENT OFFICE.

WILLIAM H. McCURDY, OF YORK, PENNSYLVANIA, ASSIGNOR TO EDWIN W. LOUCKS.

SOUND-REPRODUCING INSTRUMENT.

No. 909,645.

Specification of Letters Patent.

Patented Jan. 12, 1909.

Application filed January 24, 1908. Serial No. 412,473.

To all whom it may concern:

Be it known that I, WILLIAM H. McCURDY, a citizen of the United States, residing at York, in the county of York and State of Pennsylvania, have invented certain new and useful Improvements in Sound-Reproducing Instruments, of which the following is a specification.

The invention relates to sound reproducing instruments, and more particularly to the class of phonographs or graphophones, and which the record is formed on the surface of cylinders of composition or material capable of receiving indentations corresponding to the sound to be reproduced.

A further object of the invention is the provision of novel mechanism for disengaging automatically the reproducer from the cylinder after the said reproducer has traversed the sound reproducing portion of the record cylinder.

A further object of the invention is the provision of novel mechanism for resetting the reproducer automatically to bring it into operative position after having been brought to starting position with respect to a record cylinder.

Another object of the invention is the provision of novel means on the reproducer to limit the movement of its style-point relative to the record cylinder upon which the same is to operate.

With these and other objects of the invention, for example, the same consists in the construction, combination and arrangement of parts hereinafter referred to, and as illustrated in the accompanying drawings, which disclose the preferred embodiment of said invention, however, changes, variations and modifications may be made such as come properly within the scope of the claims hereunto appended, without departing from the spirit of the invention.

In the drawings:—Figure 1, is a rear side view of the machine. Fig. 2, is an elevation looking at the right-hand end of the machine shown in Fig. 1. Fig. 3, is a fragmental view in plan of the right hand of the machine shown in Fig. 1. Fig. 4, is an end view of the reproducer carriage with the coöperative feed mechanism associated therewith. Fig. 5, is a bottom view of the reproducer detached from its carriage. Fig. 6, is a view of the right-hand end of the reproducer carriage and its coöperative parts therewith.

Similar reference characters indicate cor-

responding parts throughout the several views in the drawings.

In the drawings the numeral 2, designates a base or support of any suitable shape and character which will conveniently hold the mechanism as will be more fully hereinafter described, and upon which is mounted a frame 3, which at the left-hand end carries a motor and governing mechanism for regulating the speed of the said motor, preferably such as is in common use at the present day on phonographs, and, therefore, the same need not be further described.

Journalled in the frame 3, are the usual shafts 4, and 5, for the reproducer carriage 6, the upper one 4, containing the ordinary screw for advancing the carriage, and the lower shaft 5, being embraced by a recess 7, at the lower extremity of the carriage for maintaining and steadying the latter in its proper vertical position. At the right-hand end of the frame the said shafts 4, and 5, respectively, are united by an end frame 22.

At the upper extremity of the carriage 6, is secured the reproducer head 8, by a fastening 9, so as to make said reproducer head a fixed part of its carriage and on the under side of it is a weighted plate 10, having pivotal connection as 11, therewith, to normally hold the style-point 12, associated with said plate in operative position. To limit the pivotal movement of the plate 10, is provided thereon a loop 13, engaging a pin 14, on the reproducer head 8, so that said plate cannot move in an arc beyond predetermined points, and which is adapted to be elevated when so desired by a lifting lever 15, pivotally mounted in the carriage and having an extension 16, adapted to contact with the said plate 10, to raise the same. This lifting lever 15, is normally held in a position to elevate the said weighted plate 10, by a spring 17, the tension of which must be overcome by appropriate mechanism hereinafter described, before the reproducer is lowered, and the carriage thrown into engagement with the feed device. Within the carriage 6, is a toothed member 18, having a central recess 19, for receiving the lifting lever 16, and the same being controlled by the movement of the latter to bring said member 18, into engagement with the feed screw to cause the travel of the carriage. Said member 18, is tensioned by a spring 20, to normally maintain the same in relative position with said lifting lever.

Upon the base 2, and appropriate standards extending upwardly from the latter is mounted a cylinder or record-carrier consisting of a shaft 23, having at one end a relatively large disk or support 24, around the periphery of which and in regular order are journaled the cylinder mandrels 25. The shafts which are connected with the mandrels 25, preferably extend through the disk 24, and provided with perforated clutch-members 26, adapting them for engagement with the motor mechanism when in a position for the reproducer to coöperate with the cylinder-carrier by the mandrels. The opposite ends of the mandrels 25, are unobstructed; as in the case of the ordinary graphophone, adapting the device for having the cylinders readily slipped on or off the same; but within the circle of cylinders at this end of the machine the shaft 23, is provided with a second disk 27, constituting a locking disk and with which a locking mechanism to be hereinafter described is adapted to coöperate for holding the cylinders rigidly while the record on one of them is being traversed by the reproducer.

The motor embodies a cylinder-driving shaft 28, and in the automatic running of the machine each cylinder is successively brought into alinement with this shaft 28, and coupled therewith by a clutch, after which the carriage and reproducer are advanced until the end of the record is reached, when the movement of the carriage automatically effects the raising of the reproducer plate 10, the unlocking of the cylinder-carrier, the disengagement of the clutch between the cylinder cone and its shaft 23, and the engagement of the motor with the cylinder carrier to advance the same until the next cylinder is in position, and, finally, the disengagement of the toothed member in the carriage from the feed screw permitting said carriage to automatically return to its starting position under the influence of a separate return motor. To accomplish these results the shaft 23, is provided with a longitudinally movable clutch 29, controlled by a shifting lever 30, and the latter in turn connected with an arm 31, on a longitudinally movable shaft 32, which latter extends from the motor end of the machine to and through the frame 22, and carries an arm 33, having an inwardly adjustable pin 34, provided with a thumb-head 35, and lock nut 35'. Said pin 34, is adapted to contact with the carriage for moving the shaft longitudinally against the tension of a spring 36, surrounding the same. The disk 27, before referred to as constituting part of the locking mechanism for holding the cylinder-carrier is preferably provided with a series of holes 37, with which a conical pin 38, on a pivoted arm 39, is adapted to coöperate. The said arm 39, is pivoted as at

40, to the base 2, and is maintained under tension by a spring 41, the latter having its free end in engagement with a depending hook 42, on the pin. At the free end of the arm 39, is a set screw 43, having a relatively long pin or projection 44, extending inwardly through the frame 22, and in position to contact with a guard member 45, pivoted to the carriage and which is limited in its movement in one direction by a stop 46, and a catch lever 47, having an extension 47', under the tension of a spring 48, when the carriage has reached the farther limit of its movement. Said catch-lever 47, releases the lifting lever 16, to elevate the reproducer plate 10, out of engagement with the record and simultaneously causes the disengagement of the toothed member 18, from the feed screw to allow the separate return motor to bring the said carriage to normal starting position. It will be noted that the carriage first approaches the pin 44, to cause the extension 47' to contact therewith and finally with the projection 34. Thus the cylinder-carrier is unlocked and also disengaged from the cylinder motor shaft by the forward travel of the carriage, and in order to effect the feed or advance of the cylinder-carrier an oscillatory drive pawl (not shown) is provided, preferably mounted on the shaft 23, in proximity to the disk 24. One end of said drive pawl which is of the ordinary construction is provided to coöperate with the disk 24, to move the latter in a step by step manner corresponding to the number of cylinder records supported thereby, while a rack-bar 48', is provided for moving the said pawl (not shown) in the opposite direction to advance the cylinder-carrier. This rack-bar 48', extends forwardly, preferably above the shafts 5, and 32, and is in position to be moved upwardly into mesh with a gear-wheel 49, which is driven constantly by the motor when running through the medium of a small pinion (not shown).

The shaft 32, is provided with a wedge or incline and when said shaft 32, is moved longitudinally by the reproducer carriage in addition to unclutching the cylinder-drive shaft from the cylinder cone the incline 50, passes under and moves the rack-bar 48', up into engagement with the gear-wheel 49, to advance the cylinder-carrier. As the rack-bar reaches the end of its stroke a notch or recess 51, comes opposite the incline and allow the rack to drop out of mesh with its gear. Then when the shaft 32, returns to its normal position the incline moves out of the notch and the rack-bar is free to return to its normal position. On the gear-wheel 49, is a projection 52, adapted to engage, during the movement of said gear-wheel, a trip lever 53, pivoted to the carriage and which is positioned directly un-

der the lower end of the lifting lever 16, so as to move the latter to lower the weighted plate 10, to bring the style-point 12, into operative position relative to the record cylinder when said carriage has been returned to its starting position.

In order now that the carriage may be automatically disengaged from the feed screw and the reproducer plate 10, held elevated during the return movement and that such disengagement and return movement shall take place after the cylinder carrier has advanced, the said carriage having the guard member 45, cooperate with the pin 44, of the locking mechanism to release the latter. The engagement of the pin 44, with the extension 47' takes place before the carriage has reached the extreme end of its travel, and as the carriage continues its movement the said guard member strikes and is deflected rearwardly by an adjustable incline 54, on the end of the frame 22, thereby riding out of engagement with the pin 44, and the latter under the influence of its spring 41, is maintained in a position to cooperate with the extension 47', releasing the said catch-lever 47, from its engagement with the lifting-lever 16, which thereupon drops and disengages the toothed-member 18, releasing the latter from the feed-screw, the tapered pin 38, entering simultaneously one of the holes 37, in the disk 27. The carriage now being disengaged is at once returned to the starting point through the medium of a flexible connection 55, extending from the carriage to and around a return motor drum 56, located on the base at the left-hand end of the machine. When so returned lever 53, is brought within range of the projection 52, on the gear-wheel and the said lever 53, raised so as to allow the reproducer plate 10, having the style-point 12, to engage the cylinder to throw the carriage into engagement with the feed-screw.

Inasmuch as with the mechanism described the reproducer plate 10, is raised only as the carriage begins its return movement and as it is desired that the cylinders shall have completed their change at this time provision may be made for preliminarily raising the reproducer plate in order that there may be no danger of injuring the reproducer or mutilating the records as the cylinder-carrier advances.

Having thus described the invention, what is claimed is:

1. In a sound reproducing machine, the combination with a record-cylinder support, a motor for driving said support, a reproducer-carriage driven by the motor, a reproducer-head fixed to said carriage, and means for automatically returning said carriage to its initial position when disengaged from the motor, of a reproducer plate pivotally connected to the reproducer-head, auto-

matically actuated lifting means carried by the carriage and independent of the motor for elevating the reproducer-plate for disengaging the same from the record-cylinder when the carriage has moved a distance in one direction, a locking device mounted on the carriage for holding the plate in depressed position and in coaction with the record cylinder, means on the carriage to operate the lock and release said lifting means when the carriage has moved a distance in the opposite direction, and means cooperative with the lifting means for bringing the carriage into and out of engagement with the motor.

2. In a sound-reproducing machine, the combination with a record-cylinder carrier, a reciprocating reproducer-carriage, and motor mechanism cooperative with the latter to move the same in opposite directions, of a reproducer-head fixed to the carriage, a pivotal plate mounted on the said head, a lifting lever on said carriage for elevating the pivotal plate, a spring engaging the lever for automatically lifting the same and elevating the plate, and automatically actuated tension controlled means cooperative with the lifting lever to bring the carriage into operative position with the motor mechanism.

3. In a sound-reproducing machine, the combination of a record-cylinder carrier, a reciprocating reproducer-carriage, and feeding means for moving the same in opposite directions, of a reproducer-head fixed to the carriage and having a movable reproducer plate, automatically actuated lifting means on the carriage and wholly independent of said feeding means for elevating said plate to disengage the same from the record-cylinder when the said carriage reaches its extreme movement in one direction, a catch-lever cooperative with the lifting means to normally hold the latter in a locked position, a guard member for the catch lever, and means controlled by the lifting means to bring the carriage into operative position with the motor mechanism.

4. In a machine of the class described, a record-cylinder support, a motor for driving the support, a reproducer carriage, a fixed reproducer-head on the carriage, a pivotal reproducer plate on the said head, a motor for returning the carriage to its initial starting position, means carried by the carriage for bringing the same into operative position with its driving motor, a lifting device for actuating the said means and also to elevate the reproducer-plate to disengage the latter from the record-cylinder, automatic means independent of the motor for lifting the device; a catch lever for locking the lifting device against movement by said automatic means, and spring controlled means adapted to actuate the said catch lever and release the

lifting device when the carriage reaches the end of the machine while moving in one direction.

5 In a machine of the class described, a record-cylinder support, a motor for driving the support, a reproducer carriage, a fixed reproducer head on the carriage, a pivotal reproducer-plate on the said head, said motor being also adapted to cause the travel
10 of the carriage in one direction, a separate motor for returning said carriage to its initial position, said second motor being wound by the action of the first-mentioned means on the carriage for bringing the same into
15 operative positions with its driving motor, a lifting device coöperative with said lifting means and also elevating the reproducer-

plate to disengage the latter from the record-cylinder, automatic means separate from the motors for lifting the device, a catch 20 lever for locking the lifting device against movement by said automatic means, spring controlled device coöperative with the catch lever to release the same and also to free the record-cylinder support to allow movement 25 thereof, a guard for said catch lever, and means for displacing said guard member.

In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM H. McCURDY.

Witnesses:

ALBERT M. EBERT,
HARRY S. LONG.

H. F. WITTIG.
ATTACHMENT FOR TALKING MACHINES.
APPLICATION FILED JAN. 15, 1908.

910,103.

Patented Jan. 19, 1909.

Fig. 1.

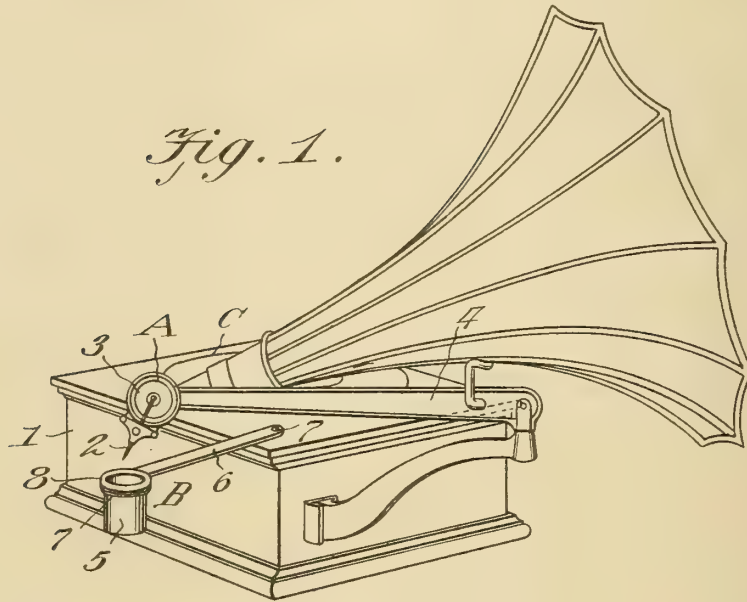


Fig. 2.

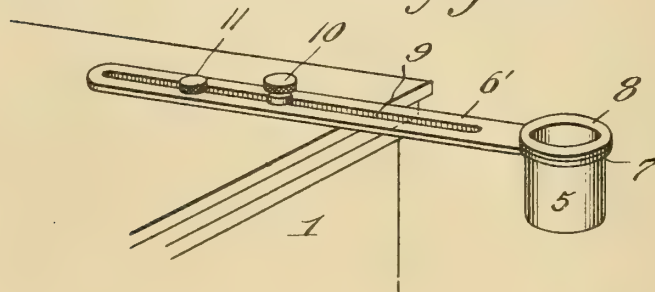
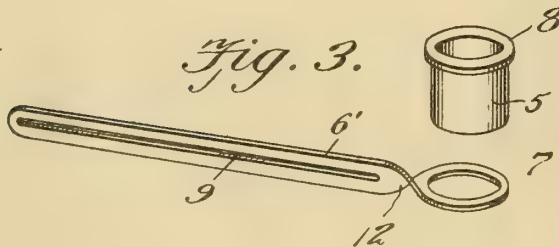


Fig. 3.



Witnesses

Frank B. Hoffman.
C. Bradway.

Inventor
Henry F. Wittig,

By *Victor J. Evans*
Attorney

UNITED STATES PATENT OFFICE.

HENRY F. WITTIG, OF BALTIMORE, MARYLAND, ASSIGNOR TO JOHN SCHELLENBERGER, OF BALTIMORE, MARYLAND.

ATTACHMENT FOR TALKING-MACHINES.

No. 910,103.

Specification of Letters Patent.

Patented Jan. 19, 1909.

Application filed January 15, 1908. Serial No. 411,002.

To all whom it may concern:

Be it known that I, HENRY F. WITTIG, a citizen of the United States, residing at Baltimore, Maryland, have invented new and useful Improvements in Attachments for Talking-Machines, of which the following is a specification.

This invention relates to attachments for talking machines, especially of that type employing disk records.

The invention has for one of its objects to provide an attachment in the nature of a receiver into which the worn and worthless needles can be dropped from time to time.

A further object of the invention is the provision of a receptacle mounted on an arm that is attached to the stand or cabinet of the talking machine in such position that the sounding box carrying arm can be swung outwardly over the receptacle so that the needles when loosened can drop into the receptacle and thus prevent them from falling about on the floor.

With these objects in view and others, as will appear as the description proceeds, the invention comprises the various novel features of construction and arrangement of parts which will be more fully described hereinafter and set forth with particularity in the claims appended hereto.

In the accompanying drawing, which illustrates one of the embodiments of the invention, Figure 1 is a perspective view of a talking machine with the attachment applied thereto and the sounding box carrying arm in position to drop the needle into the attachment. Fig. 2 is a perspective view of a modified form of attachment. Fig. 3 is a further modified form.

Similar reference characters are employed to designate corresponding parts throughout the several views.

Referring to the drawing, A designates a talking machine of any approved type, and B, the attachment for receiving the ejected needles from the machine. The attachment is mounted on the casing or cabinet 1 in such a position that the needle 2 of the sounding box 3 carried by the swinging arm 4, can be readily dropped into the receptacle or basket 5 of the attachment.

The attachment consists of an arm 6 pivoted at 7' on the top of the casing 1 and carrying at its outer extremity the receptacle 5. The arm terminates in a ring 7 in which the

receptacle is held, there being an annular flange 8 forming a rim which engages the ring 7 and prevents the receptacle from dropping through the latter, and in this manner, the receptacle is removably supported so that it can be taken out when it is desired to empty the same. Normally, the arm 6 is swung inwardly so that the receptacle will be disposed closely adjacent the casing 1, so as to be out of the way.

Instead of having the arm pivotally mounted, it may be constructed as shown in Figs. 2 and 3 so as to have a sliding movement. In these figures, the arm 6' is provided with a longitudinal slot 9 and is mounted either on the top or side of the casing 1. When mounted on the top, the form shown in Fig. 2 is employed and it is clamped in position by a set screw 10 that passes through the slot 9 and screws into the casing 1. Coöperating with the screw for guiding the movement is a headed stud 11 fastened to the casing, as shown. Normally, the arm is pushed inwardly as far as it will go, and when it is desired to adjust the arm in a position to permit the receptacle to receive the needles, as when records are made, the arm is drawn outwardly so that the receptacle will lie directly in the arc in which the sounding box 3 on the swinging arm 4 moves. In Fig. 3, the arm 6' is given a quarter turn at 12, so that the ring 7 will be disposed horizontally and the slotted portion or shank of the arm, vertically for applying to the side of the casing 1.

In practice, the swinging arm 4 is normally disposed over the record disk C of the machine and the needle receiving attachment is adjusted inwardly so as to be out of the way. When reproducing from a number of records, it is the usual practice to employ fresh needles for each record and to receive the discarded needles, the arm of the attachment is adjusted so that the receptacle will occupy a position directly under the needle 2 when the arm 4 is swung outwardly beyond the casing 1. The needle can then be unfastened and dropped into the receptacle as a new needle is inserted. In this way, the needles will be conveniently collected and will not have to be dropped into the hand or on the floor.

From the foregoing description, taken in connection with the accompanying drawing,

the advantages of the construction and of the method of operation will be readily apparent to those skilled in the art to which the invention appertains, and while I have
5 described the principle of operation of the invention, together with the device which I now consider to be the best embodiment thereof, I desire to have it understood that the device shown is merely illustrative, and
10 that such changes may be made when desired as are within the scope of the claims.

Having thus described the invention, what I claim is:—

1. The combination of a phonograph including a supporting structure, and a swinging needle carrying-element, with a needle receptacle, and means for adjustably mounting the receptacle on the structure for positioning the receptacle in the line of movement

of the needle on the element, said means being arranged to be retracted close to the structure when the receptacle is not in use.

2. A needle-receiving attachment for talking machines comprising a strip of metal having a twist intermediate its ends formed into a ring at one side of the twist and provided with a longitudinal slot at the opposite side of the twist, and a receptacle removably supported in the ring, in combination with separate fastenings for adjustably
25
30 securing the strip in place.

In testimony whereof I affix my signature in presence of two witnesses.

HENRY F. WITTIG.

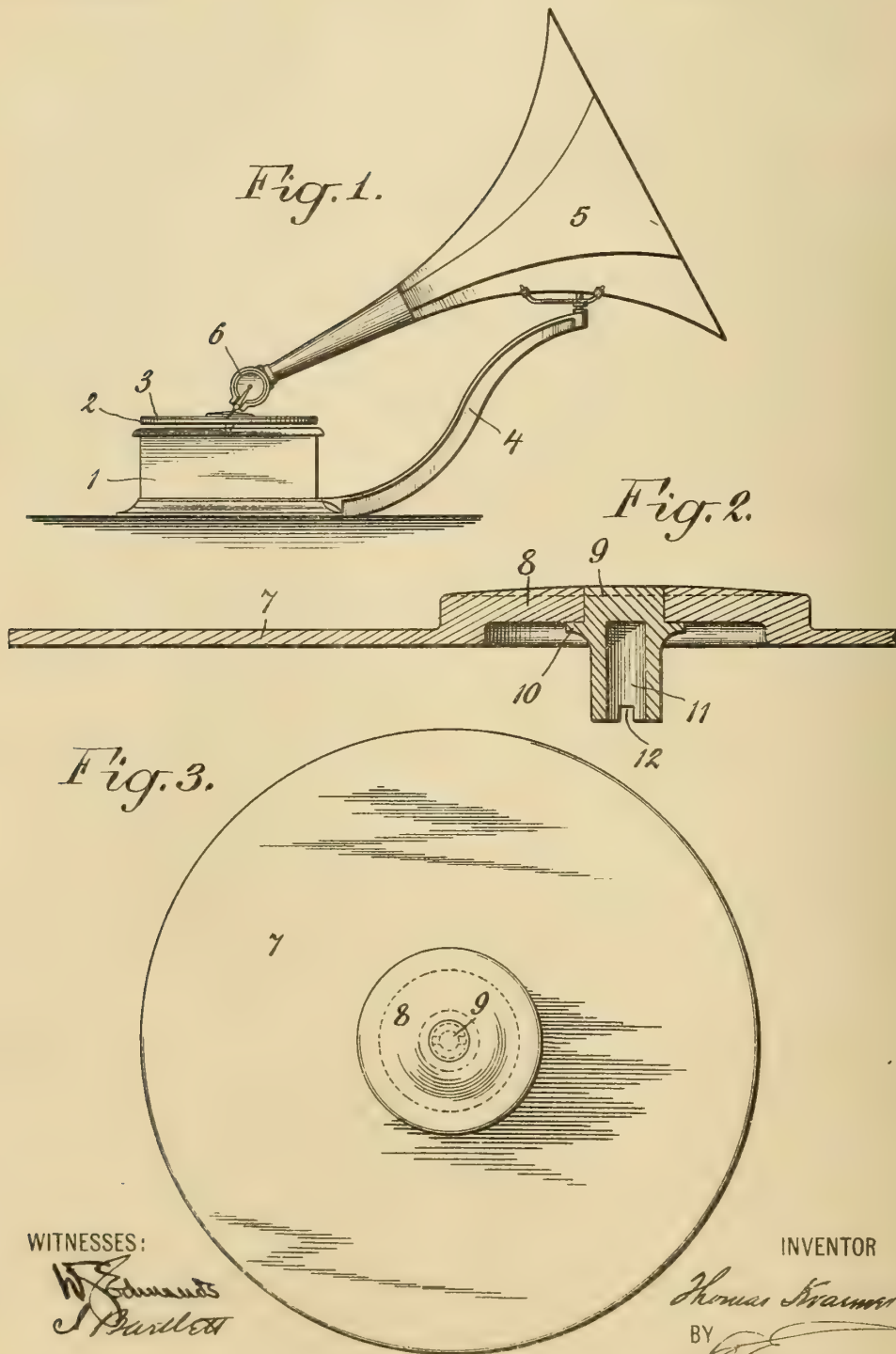
Witnesses:

AUGUSTUS W. BRADFORD,
ERNEST T. McELROY.

T. KRAEMER.
TALKING MACHINE.
APPLICATION FILED MAR. 27, 1908.

910,208.

Patented Jan. 19, 1909.



WITNESSES:

W. Edwards
J. Bartlett

INVENTOR

Thomas Kraemer

BY

W. Edwards
ATTORNEY

UNITED STATES PATENT OFFICE.

THOMAS KRAEMER, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO HAWTHORNE & SHEBLE MANUFACTURING COMPANY, OF PHILADELPHIA, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

TALKING-MACHINE.

No. 910,208.

Specification of Letters Patent.

Patented Jan. 19, 1909.

Application filed March 27, 1908. Serial No. 423,674.

To all whom it may concern:

Be it known that I, THOMAS KRAEMER, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented a certain new and useful Improvement in Talking-Machines, of which the following is a specification.

This invention relates to talking machines and has reference, more particularly, to the turntables of such machines on which sound-records of disk shape are supported during the operation of reproducing the recorded sounds.

In the exploitation of talking machines and sound-records therefor, it has been found desirable to so construct the machines or certain of the parts thereof as to preclude the use with such machines of records of other than a particular make, the object in doing this being to insure to the seller of a machine a reasonable profit from the sale of records for use thereon, such as will induce him to sell the machine at a low price. Heretofore, it has been sought to accomplish this by providing the turntables of talking machines which support the disk sound-records during the reproducing operation, with one or more projections of peculiar shape so that only records formed to correspond with such projections will lie flat upon the turntables in position for reproducing. These turntables as heretofore constructed, however, have not been successful in attaining the desired result. Thus, turntables have been provided with one or more integral projections of small cross-section on the upper faces thereof designed to pass through corresponding openings in the sound-records; but as these turntables are made of cast metal, a sharp blow with a hammer on the projection will cause it to break off practically flush with the surface of the turntable, and thereafter standard disk records may be used thereon. If projections of larger cross-sectional area were employed, such that they could not be broken off with a hammer, these could still be removed by putting the turntables in a lathe and cutting the projections down to the level of the faces of the turntables.

My invention is directed to the provision of a turntable of an improved construction, such that with it the use of sound-records of

other than the desired make is effectually prevented.

The preferred embodiment of the invention is illustrated in the accompanying drawings, in which—

Figure 1 is an elevation of a talking machine, Fig. 2 is a central section of the turntable, broken away in part, and Fig. 3 is a top view of the turntable.

Referring to these drawings, a talking machine of a well-known type is illustrated, but it will be understood that the invention is applicable generally to all machines for reproducing from disk sound-records. The machine shown has a motor-box 1 within which is a motor driving a vertical shaft carrying at its upper end outside the box the turntable 2 on which the sound-record 3 rests. Secured to and extending outwardly from the box is an arm 4 on which an amplifying horn 5 is pivotally mounted. The reproducing mechanism 6, consisting of a sound-box and its stylus, is secured to the small end of this horn with the stylus tracking in the record-groove in disk 3.

The construction of the turntable is shown in Figs. 2 and 3. It consists of a flat disk having an annular portion 7, the upper face of which lies in a single plane. At the interior of this annular portion is an integral portion 8 which is raised somewhat above the surface of the annular portion 7 so that the under surface of portion 8 is slightly above the plane of the upper surface of annular portion 7 as shown in Fig. 2. At the center of the raised portion 8, means are provided to facilitate mounting the turntable in position on the shaft of the talking machine. Any suitable means may be provided for this purpose. In the present instance, the portion 8 is shown as having a central opening therethrough to receive the upper end of a member 9 which is secured within this opening, proper positioning of the parts relatively being insured by a circumferential flange 10 on member 9 coacting with the under surface of the raised portion 8. Extending up within the member 9 is a bore 11 to receive the upper end of the shaft of the motor and the wall of this bore may have a notch 12 therein to receive a pin on the shaft and thus insure the turning of the turntable with the shaft of the motor.

With the form of turntable herein de-

scribed, sound-records of annular form may be employed, these resting upon the upper face of the portion 7 with the raised portion 8 passing through the central opening therein. The peripheral shape of the raised portion 8 may be changed as desired to limit the machine to use with a particular style of records only. In any case, the turntable cannot be so changed as to adapt it for use with standard records. This is due primarily to the provision of the hollow raised portion 8 having its under surface flush with or above the upper surface of the annular portion 7. It will be seen that if the raised portion 8 were cut down in the effort to adapt the turntable for use with standard records, the central portion of the turntable would be severed from the outer portion and the turntable rendered useless.

Having now described my invention, what I claim as new therein and desire to secure by Letters Patent is as follows:—

1. A talking machine comprising a motor-box having a motor therein driving a vertical shaft, a turntable on said shaft, a sound-record on said turntable, a pivotally mounted sound-conveying tube, and reproducing mechanism secured to said tube with its stylus tracking in the groove in said record, said turntable having an outer annular portion on which the sound-record rests and an inner raised portion and the under surface of said raised portion being above the upper surface of the outer annular portion, substantially as set forth.

2. A turntable for a talking machine adapted to be mounted upon the motor-shaft

of the machine, said turntable having an outer portion and an inner raised portion and the under surface of said raised portion being above the upper surface of said outer portion, substantially as set forth.

3. A turntable for a talking machine having an outer annular portion, an inner raised portion integral therewith and having its under surface above the upper surface of said outer annular portion, and a member secured within a central opening in said raised portion, said member being formed to coact with the motor-shaft of the machine to support the turntable, substantially as set forth.

4. A turntable for a talking machine adapted to be mounted upon the motor-shaft of the machine, said turntable having an outer portion and an inner raised portion and the under surface of said raised portion lying in substantially the same plane as the upper surface of said outer portion, substantially as set forth.

5. A turntable for a talking machine adapted to be mounted upon the motor-shaft of the machine, said turntable having an outer annular portion and an inner raised portion integral therewith and the under surface of said raised portion being above the upper surface of said outer portion, substantially as set forth.

This specification signed and witnessed this 23rd day of March, 1908.

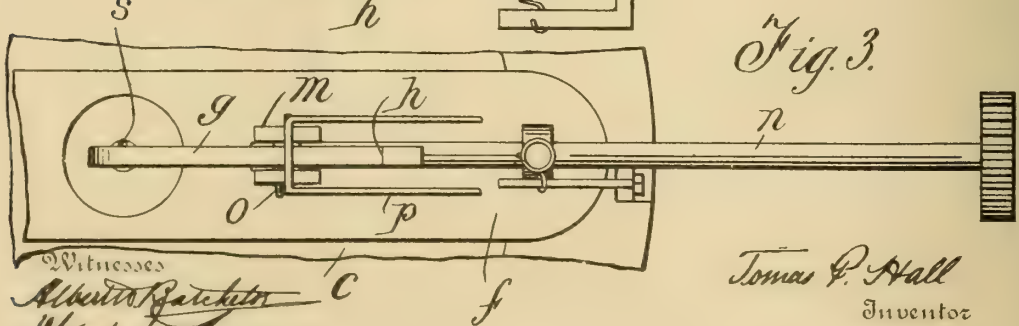
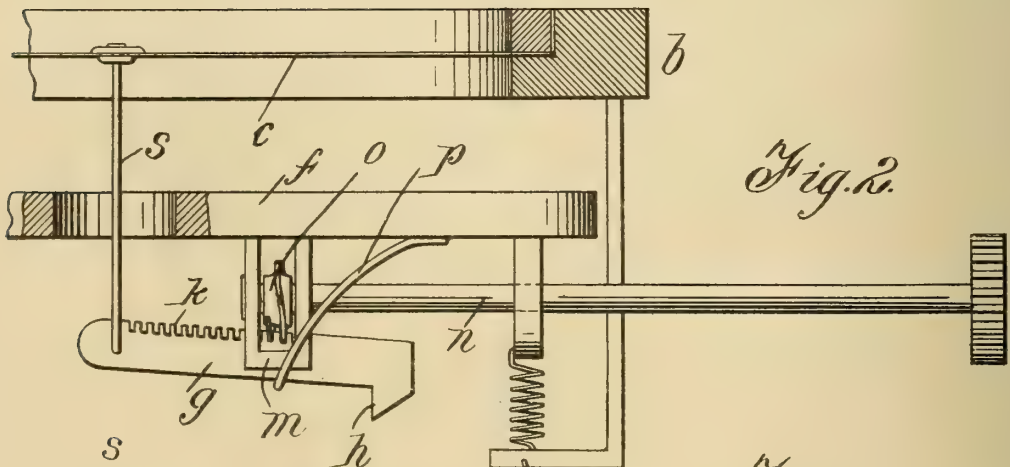
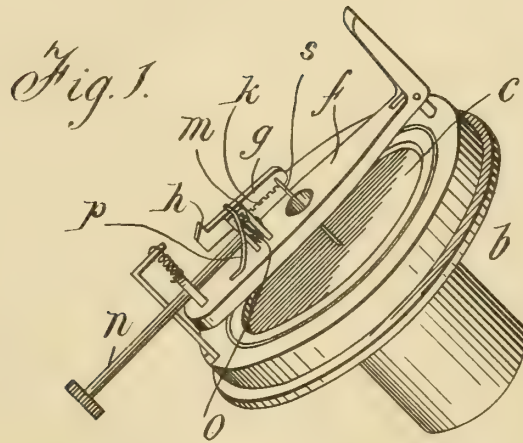
THOMAS KRAEMER.

Witnesses:

H. MUHLSCHLEGEL,
EMIL SCHNELL.

910,529.

Patented Jan. 26, 1909.



Witnesses
Albert H. Batchelor
Edw. J. Sears

Thomas P. Hall
 Inventor

By Attorney
Wm. H. Waw

UNITED STATES PATENT OFFICE.

TOMAS PROCTOR HALL, OF VANCOUVER, BRITISH COLUMBIA, CANADA.

GRAPHOPHONE.

No. 910,529.

Specification of Letters Patent.

Patented Jan. 26, 1909.

Application filed October 3, 1907. Serial No. 395,799.

To all whom it may concern:

Be it known that I, TOMAS PROCTOR HALL, of the city of Vancouver, Province of British Columbia, Canada, have invented certain new and useful Improvements in Graphophones.

My invention relates particularly to the reproducer and it has for its object to enable the amplitude of vibration of the mica diaphragm to be adjusted, and thereby soften or reduce the volume of sound without altering the quality of the tone, or amplify such tone; and to this end I provide for the adjustment of the lever upon which the needle or jewel tip is carried for the purpose of varying its fulcrum. For full comprehension, however, of my invention, reference must be had to the accompanying drawings in which similar reference characters indicate the same parts and wherein—

Figure 1 is a perspective view of a reproducer inverted and drawn to an enlarged scale, with my invention applied thereto; Fig. 2 is a side elevation of the immediate parts thereof to which my invention applies; and Fig. 3 is a plan view thereof.

The reproducer is indicated at *b* and the mica diaphragm at *c*.

f is the bar upon which is usually mounted the lever *g* carrying the needle or jewel point *h*. According to my invention the lever *g* is formed with a series of ratchet teeth *k* and it is located slidably between the legs of a U-bracket *m* mounted rigidly upon the bar *f* and serving as a bearing for a rotary spindle *n* carrying a worm-wheel *o* rigidly thereon, the legs of the bearing *m* being slotted to accommodate such worm-wheel, while a bow spring *p* carried by the bar *f* bears across the ends of the U-bracket and retains the lever *g* yieldingly in engagement with the worm wheel. This arrangement has the effect of fulcruming the lever *g* on the thread of the worm wheel *o*, while the tail of the lever is as usual connected by a wire *s* to the diaphragm *c*.

In order to soften or reduce the volume of

sound the spindle *n* is turned to move the lever *g* with relation to its fulcrum towards the right (looking at Figs. 2 and 3) thereby reducing the extent of vibration of the diaphragm which has the effect of making the sound more mellow; and to increase the volume the lever is adjusted in the opposite direction.

What I claim is as follows:—

1. A talking machine reproducer having a lever for carrying the needle or jewel tip, a rotary spindle, means securing such spindle permanently against longitudinal movement, and means carried rigidly by the spindle for operatively connecting the spindle to the lever whereby the said lever is adjusted with relation to its fulcrum for the purpose of varying the volume of sound.

2. A talking machine reproducer having a lever for carrying the needle or jewel tip, such lever having one side toothed; a worm wheel operatively engaging the said teeth and upon which the said lever is fulcrumed, and means for rotating the worm wheel for the purpose of adjusting the lever longitudinally relatively to the said worm wheel.

3. A talking machine reproducer having a lever for carrying the needle or jewel tip, such lever having one side toothed; a rotary spindle mounted upon the reproducer, a worm wheel mounted rigidly on the spindle and operatively engaging the said teeth and upon which the said lever is fulcrumed, a bow spring secured to the reproducer and retaining the lever yieldingly in engagement with the worm wheel, and means for rotating the worm wheel for the purpose of adjusting the lever longitudinally relatively to the said worm wheel.

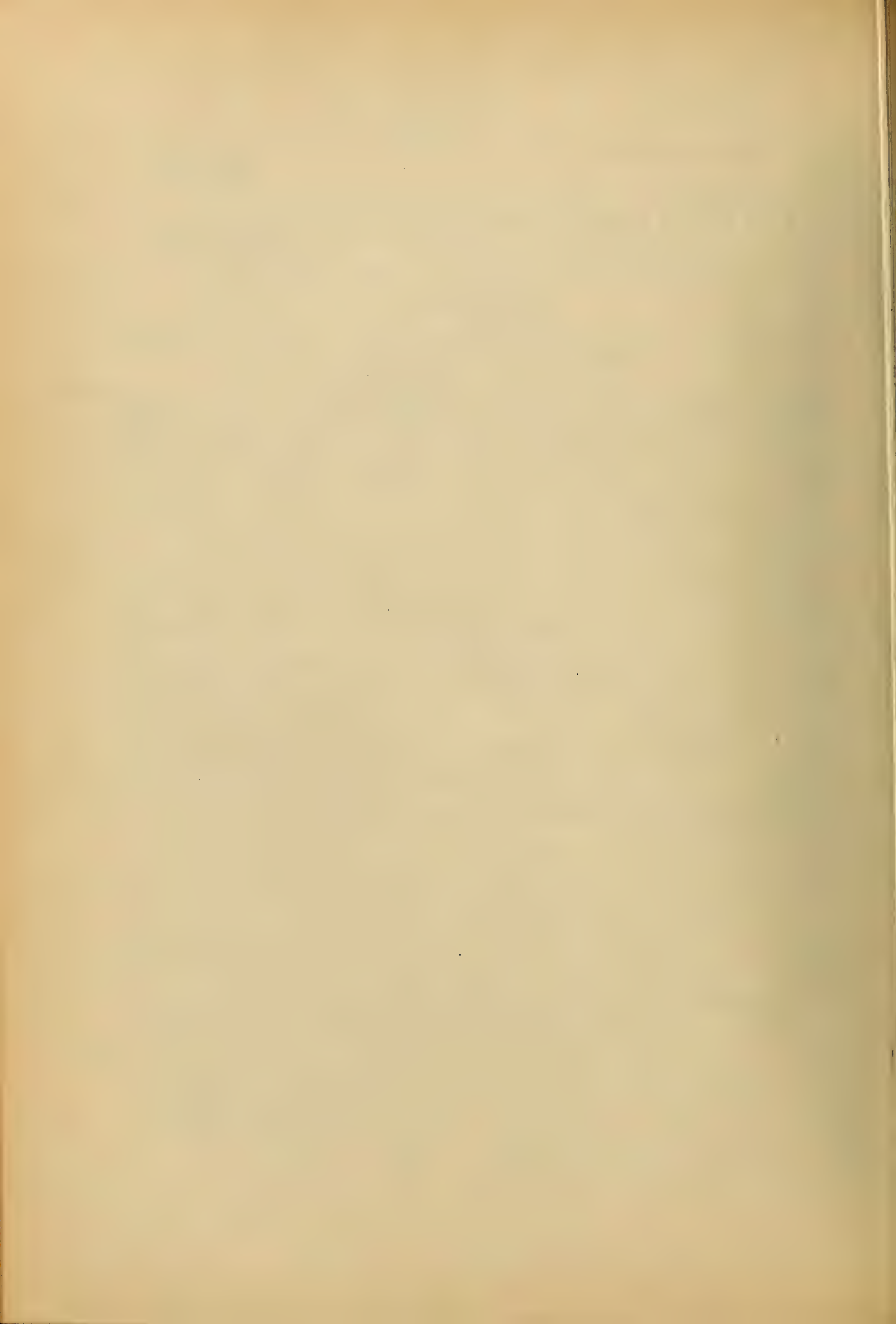
In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

TOMAS PROCTOR HALL.

Witnesses:

EDNA B. BEARDSLEE.

RUTH McMANUS HALL.



G. BUELNA.
 AUTOMATIC BRAKE FOR TALKING MACHINES.
 APPLICATION FILED MAY 11, 1908.

911,202.

Patented Feb. 2, 1909.

Fig. 1.

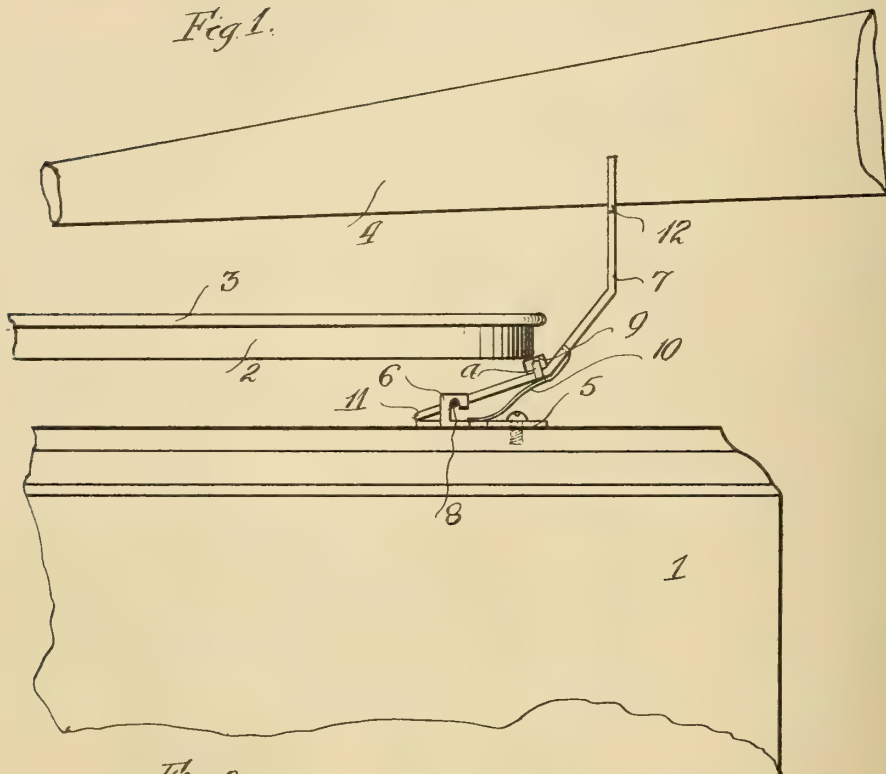


Fig. 2.

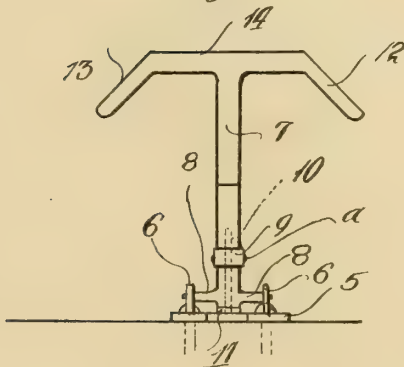
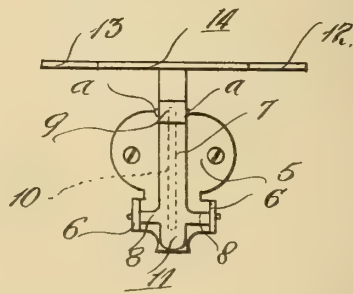


Fig. 3.



WITNESSES:
 Edgar Glatfner.
 Alfred H. Daehler.

INVENTOR:
 Guadalupe Buelna
 by Anton Glatfner, Jr.
 his Atty.

UNITED STATES PATENT OFFICE.

GUADALUPE BUELNA, OF SANTA BARBARA, CALIFORNIA, ASSIGNOR OF ONE-HALF TO
ARTHUR E. BURSON, OF SANTA BARBARA, CALIFORNIA.

AUTOMATIC BRAKE FOR TALKING-MACHINES.

No. 911,202.

Specification of Letters Patent.

Patented Feb. 2, 1909.

Application filed May 11, 1908. Serial No. 432,261.

To all whom it may concern:

Be it known that I, GUADALUPE BUELNA, a citizen of the United States, residing at Santa Barbara, in the county of Santa Barbara and State of California, have invented certain new and useful Improvements in Automatic Brakes for Talking-Machines, of which the following is a specification.

This invention relates to brakes for talking machines and particularly to that class of brake caused to be actuated automatically by the sound box carrier arms of phonographs.

An object of this invention is to provide a brake, which combines simplicity with efficiency and which is readily and quickly applicable to all talking machines, in avoidance of all necessity for adjustment to the varying sizes of disks now manufactured.

In contradistinction to the brakes now manufactured and used, this invention contemplates the provision of an automatic brake designed to act upon the under surface of the disk carrier periphery. By causing the braking action to be effected in this manner, lateral strains and excessive wear of the elements of a brake are reduced to a minimum if not completely eliminated. Consequently the brake may act with superior velocity without causing the strains by reason of the rotary motion of the disk carrier to be concentrated to one particular point. A brake after the present type not only causes the gentle application of the braking effect, but assists the carrier arm for the sound box to traverse the ungrooved surface of the record previous to the application of the brake which is nearly simultaneous with the completion of the reproduction of the record.

This invention comprises such other features, details of invention and combination of parts as will appear in the accompanying drawing, and then to be more particularly pointed out in the claims.

In the drawing: Figure 1, is a side elevation of the invention as applied. Fig. 2, is a front elevation, and Fig. 3, is a plan view.

Specific reference being had to the drawing, 1. designates the motor containing box of an ordinary talking machine, 2. is a record carrier, 3. a disk record, and 4 a sound

box carrier arm of the ordinary type. Upon the box 1 is arranged to be fastened by any suitable means, a plate 5 having two hooks 6 made integral with the plate 5.

7 is a lever provided with arms 8 to engage the hooks 6. This lever is provided with a brake shoe, 9 held on the same by the prehensile tangs *a* provided on the said lever 7. 10 is a spring, one end of which exerts tension against the underside of the lever 7, and the other end of which is in loose engagement with the plate 5, in this manner giving to said lever a position which is normally angular to the parallel axis of the motor containing box 1, thereby causing the brake shoe 9 when free, to act under the pressure of the spring to bear against the outer under periphery of the disk-carrier. A tang 11 is formed contiguous with the said lever 7 at a point beyond the said arms 8, this provision being made to limit the movement of the lever in an upward direction.

The lever 7 terminates in substantially a T, having its respective ends 12 and 13 bent. When the sound-box stylus is placed in the outermost groove of the record preparatory to the reproduction thereof, the sound box carrier arm, depressing the lever 7 releases the brake shoe and leaves the motor free to rotate the disk-carrier. The bend 12 is provided to cause the initial release of the brake as well as to facilitate the travel of the carrier arm onto the flat surface 14 of the T. The movement of the carrier arm onto the said flat surface continues to hold the lever 7 and the brake inoperative until the carrier arm reaches the bend 13, when the lever is free and the spring 10 forces the lever upwardly thereby bringing the brake shoe 9 into speedy and firm engagement with the periphery of the disk carrier, and stopping the rotation of the disk carrier upon the reproduction of a record, irrespective of the size thereof. The bend 13 does not only free the lever, but has a tendency to force the carrier arm towards the center of the record when for any reason the stylus of the sound box does not escape from the last groove of the record.

It will be seen from the above description that the brake is held inoperative and the

turntable free to rotate only while the reproducer arm engages the inclined portion 12 and the horizontal portion 14.

What I claim is:

5 1. The combination of a disk carrier, a support therefor and a sound box carrier arm, with a brake in operative relation to the underside of said disk carrier, said brake
10 controllable by the movement of said sound box carrier arm.

2. A disk carrier, a support therefor, and a sound box carrier arm in combination with the brake lever having a normal contact with the sound box carrier arm during a part of
15 the travel thereof to hold the same inoperative, and means to cause the said lever to escape from the sound box carrier during another part of the travel thereof.

3. A disk carrier, a support therefor, and a sound box carrier arm in combination with a brake lever having a normal contact with the sound box carrier arm during a part of
20 the travel thereof to hold the same inoperative, and an inclined portion on said lever to cause said lever to escape from the sound
25 box carrier during another part of the travel thereof.

4. A disk carrier, a support therefor, and a sound box carrier arm in combination with
30 the brake lever having a normal contact with the sound box carrier arm during a part of

the travel thereof to hold the same inoperative, and means carried by said lever to cause said lever to escape from the sound box carrier during another part of the travel thereof. 35

5. In combination with the disk carrier, a support therefor and a sound box carrier arm, a brake comprising a lever arranged to have normal contact with said carrier arm to hold said brake inoperative during a part of
40 the travel of the said carrier arm, and means to operate said brake to contact with the underside of said disk carrier during another part of the travel of said sound box carrier.

6. A brake for talking machines and the like, comprising a support, a spring actuated lever pivoted in said support, a brake shoe carried by said lever and arranged to engage the underside of the disk carrier of a talking machine, and means on said brake to actuate
50 the brake.

7. A brake for talking machines and the like, comprising a spring actuated lever, a support therefor, said lever having a T-shaped arm to successively hold and release
55 said lever at different times, said lever being actuable by the movement of the sound box carrier of the talking machine.

GUADALUPE BUELNA.

Witnesses:

J. H. BURSON,
J. A. COATES.

E. GILBERT, AN INSANE PERSON.
M. E. GILBERT, GUARDIAN.
REPEATING MECHANISM FOR PHONOGRAPHS.

911,491.

APPLICATION FILED NOV. 18, 1904.

Patented Feb. 2, 1909.

2 SHEETS—SHEET 1.

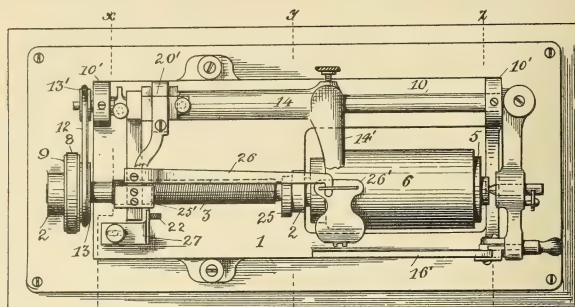


Fig. 1.

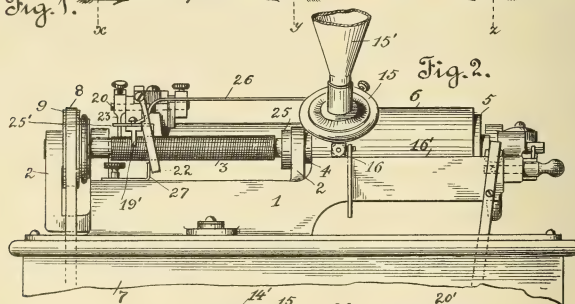


Fig. 2.

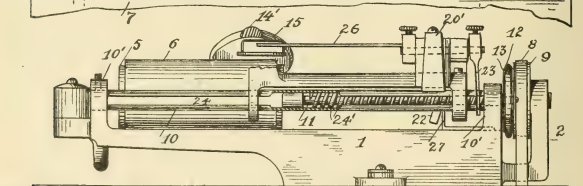
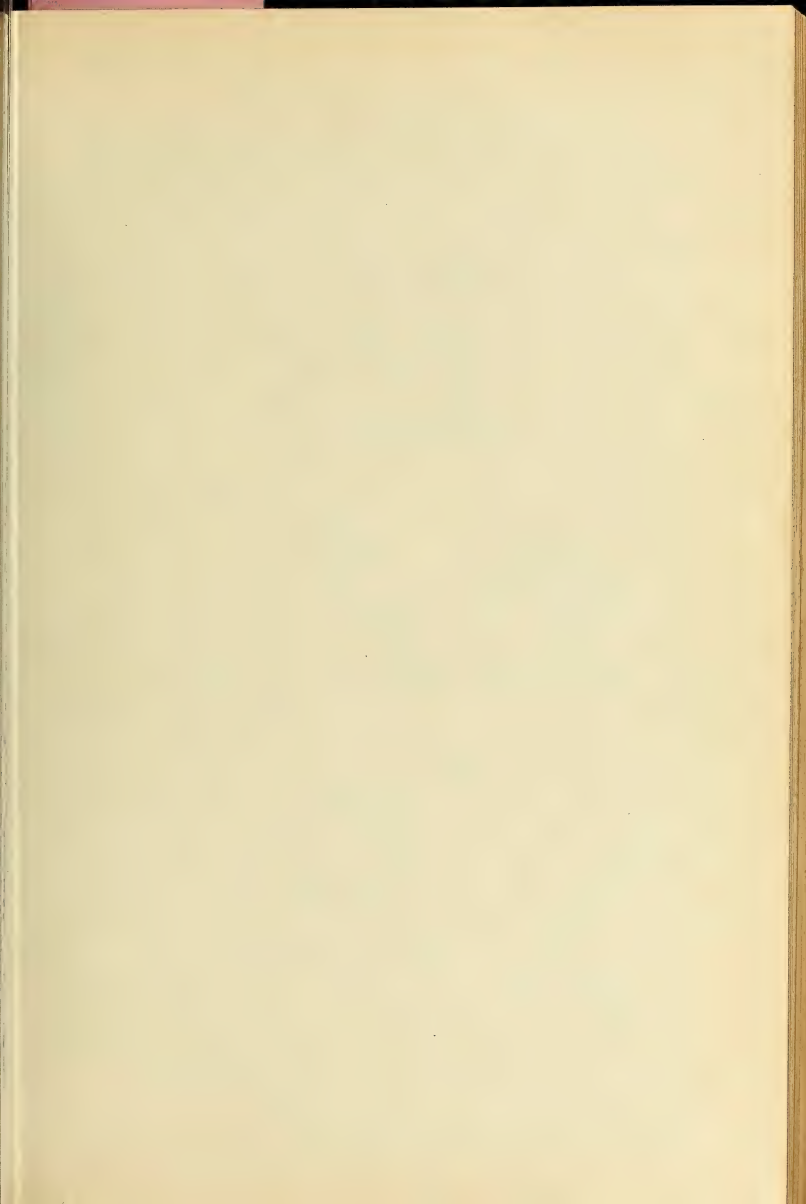


Fig. 3.

Witnesses.
W. H. A. W. de
Thos. R. Heath

Inventor.
Elmer Gilbert
by *N. A. Acker*
his atty.



E. GILBERT, AN INSANE PERSON.

M. E. GILBERT, GUARDIAN.

REPEATING MECHANISM FOR PHONOGRAPHS.

APPLICATION FILED NOV. 18, 1904.

Patented Feb. 2, 1909.

2 SHEETS—SHEET 2.

911,491.

Fig. 4.

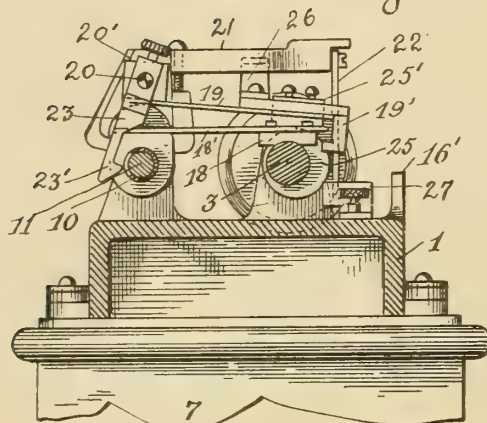


Fig. 7.

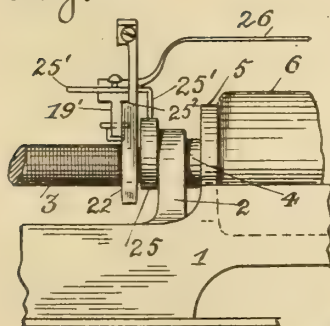


Fig. 5.

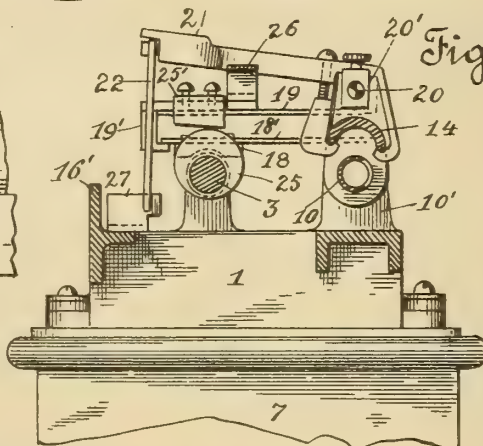
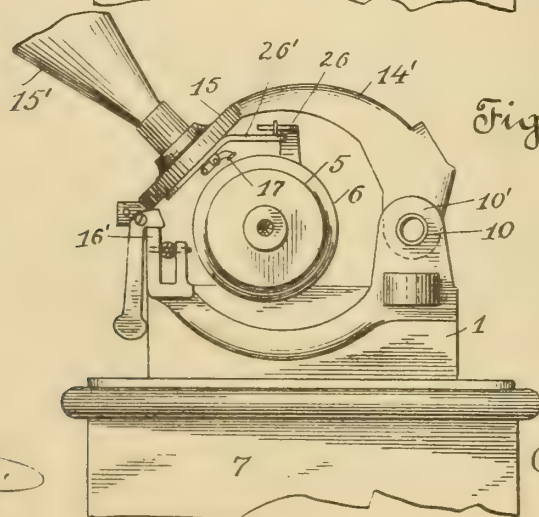


Fig. 6.



Witnesses.

W. H. H. H. H. H.

The H. H. H. H. H.

Inventor.
E. Gilbert
by *N. A. A. A.*
his atty.

UNITED STATES PATENT OFFICE.

ELAM GILBERT, OF PORTLAND, OREGON; MATTIE E. GILBERT, GUARDIAN OF SAID ELAM GILBERT, AN INSANE PERSON, ASSIGNOR, BY MESNE ASSIGNMENTS, TO ALBERT A. KLINGMAN, OF NEW YORK, N. Y.

REPEATING MECHANISM FOR PHONOGRAPHS.

No. 911,491.

Specification of Letters Patent.

Patented Feb. 2, 1909.

Application filed November 18, 1904. Serial No. 233,321.

To all whom it may concern:

Be it known that I, ELAM GILBERT, a citizen of the United States, residing at Portland, in the county of Multnomah, State of Oregon, have invented certain new and useful Improvements in Repeating Mechanism for Phonographs; and I do hereby declare the following to be a full, clear, and exact description of the same.

This invention relates to improvements in repeating mechanism for phonographs, the novel features of which will be apparent from the detailed description thereof hereinafter contained and the hereto appended claims.

To comprehend the invention reference should be had to the accompanying drawings, wherein—

Figure 1 is a top plan view of a phonograph with the diaphragm or reproducer head removed, the position of the reproducing stylus being illustrated and likewise the means for raising the same clear of the record; Fig. 2 is a front view in elevation of the mechanism disclosed by Fig. 1 of the drawings, in said view the diaphragm or reproducer head being illustrated in position with a portion of a horn applied thereto; Fig. 3 is a rear view in elevation of the parts disclosed by Fig. 2 of the drawings, the sleeve on which the traveler works being partly broken and an arm connecting the reproducer head or diaphragm to the traveler being also broken. Fig. 4 is an irregular cross sectional end view in elevation, taken on the line $x-x$ Fig. 1 of the drawings, and viewed in the direction of the arrow on the dotted line thereof. Fig. 5 is a similar view taken on the line $y-y$ and viewed in the direction of the arrow, crossing said line, the parts being illustrated in the position assumed thereby when raised to lift the reproducing stylus clear of the record, in said view the position of the diaphragm or reproducer head is understood to be on the end of its outward movement; Fig. 6 is a similar view to that of Figs. 4 and 5 taken on the cross sectional line $z-z$ Fig. 1 of the drawings, the reproducer head or diaphragm being illustrated in its returned position and the reproducing stylus thereof raised clear of the record, said view illustrating the parts just prior to the lowering of the needle to place same onto the record; and Fig. 7 is a detail broken front view in elevation disclosing the position of

the oscillator when raised its full upward distance and the position of the catch lever when swung inwardly to lock the arm which carries the spring lever to actuate the reproducing stylus for holding same clear of the record during the return movement of the diaphragm or reproducer head.

The numeral 1 is used to indicate the bed of an ordinary "Edison Home Phonograph", within bearings 2 of which works the worm feed shaft 3. The projecting end 4, of this shaft, carries the record cylinder 5, onto which slips the record 6, to be reproduced. The said worm feed shaft 3 is driven from the operating mechanism, located within the casing or housing 7, by means of the drive belt 8, which works over the belt pulley 9, attached to the shaft 3.

At the rear of the bed 1 is arranged a slotted sleeve 10, which is held between the supporting standards 10', upwardly projecting from said bed. Within the sleeve is located the return worm shaft 11, which shaft is driven from the feed worm shaft 3 by means of the belt 12, which works over the pulleys 13—13' mounted respectively on the shafts 3 and 11.

On the sleeve 10 is longitudinally movable the traveler 14, from one end of which projects the laterally extending curved arm 14'. This arm carries the diaphragm or reproducer head 15, which head is provided with the usual "sound box", and has provision for the reception of the horn 15'. The said diaphragm or reproducer head is supported at its free end by means of the depending roll 16, which roll rides on the trackway 16' of the bed 1. To the under face of the said diaphragm or reproducer head is hinged the reproducing stylus 17, which works or travels within the grooves of the record 6, during the reproduction or playing of the said record.

The reproducer head 15 is caused to traverse the length of the record by means of the threaded feed nut 18, which nut engages with the threads of the worm feed shaft 3. This nut is held secured to the outer end of and held in position by means of the spring arm 18', said arm projecting laterally from the end of the traveler 14 opposite to that from which springs the curved supporting arm 14'.

Immediately above the spring arm 18', there is located a spring arm 19. The for-

ward end of this arm is provided with a downwardly extending hooked extension 19', which, as the arm 19 is raised, engages the under face of the projecting end of the arm 18', in order to lift the feed nut 18 clear or out of engagement with the threads of the worm feed shaft 3. Said plate or arm 19, at its inner end, is attached to a rock-shaft 20, working within a block 20', attached to the traveler 14, in advance of the spring arm 18'. From this block 20', project laterally an arm 21, to the free end of which is pivoted a longitudinally movable catch lever 22, which, when the arm 19 is lifted, swings beneath the outer end of said arm and holds the same in its lifted position to maintain the feed nut 18 clear of or out of engagement with the worm feed shaft 3.

To the oscillatory or rock-shaft 20 a depending finger 23 is secured, the lower end 23' of which is curved so as to enter within the slotted portion 24 of the sleeve 10, and engage the thread 24' of the worm shaft 11 when the spring arm 19 is raised. This finger is thrown into and out of engagement with the worm shaft 11 with the raising and lowering of the said spring arm 19.

The threads 24', of the worm shaft 11, are at a pitch the opposite to that of the feed worm shaft 3, so that when the finger 23 is in engagement therewith, a reverse movement or travel is imparted the traveler 14, than when the feed nut 18 is in engagement with the threads of the said worm feed shaft 3.

To the inner end portion of the worm feed shaft 3, there is secured a cam collar 25, which, as the reproducer head approaches the end of the record 6, is engaged by an oscillator 25', hinged to and depending from the arm 19. As this oscillator rides onto the surface of the cam collar 25, during the rotation of the worm feed shaft, the same is gradually raised by the inclination of the cam collar, lifting therewith the arm 19, which in turn raises the outer end of the arm 18', until the same is carried above the notched portion 25² of the catch lever 22, when the said catch lever, by its own weight, swings beneath the end of the arm 19 and holds the same in its raised position. At the same time, the nose 23' of the depending finger 23, by the movement of the rock shaft 20, with the raising of the arm 19, is moved into engagement with the thread of the driven worm shaft 11, which causes the traveler 14, with its reproducer head and connected parts, to move in an opposite direction to that imparted thereto by the feed nut 18 engaging with the feed worm shaft 3, in other words reverse the movement of the traveler and return the reproducer head to its starting point.

To the arm 19 there is attached a forwardly extending spring rod or lever 26, the free end of which is loosely connected to the

tail extension 26', of the hinged counter-balance weight that carries the reproducing stylus 17.

The rod or lever is raised with the uplifting of the arm 19 as the oscillator 25' rides onto the cam collar 25, which throws the hinged reproducing stylus 17 so as to raise its point clear of the grooves of the record 6. It will be understood that this takes place just prior to the finger 23 being moved into engagement with the return worm shaft 11.

The position of the reproducer head is not disturbed during the return movement thereof to repeat the record, inasmuch as the reproducing stylus itself is raised clear of the grooves of the record without the uplifting or swinging upward of the reproducer head.

The arm 19 is held in its raised position, to hold the reproducing stylus clear of the surface of the record, until the reproducer has been returned to its starting position, when the same is released, the finger 23 thrown out of engagement with the return worm shaft 11, the reproducing stylus lowered onto the record 6 and the feed nut 18 placed into engagement with the feed worm shaft 3, by means of the trip stop 27. The lower end of the catch lever 22 bears against this trip stop 27, as the traveler 14 approaches its limit of inward travel, and the said lever is gradually forced outward, until its notched shoulder portion is moved from beneath the arm 19, which permits the said arm to drop and throws the finger 23 out of engagement with the worm shaft 11. The reproducer mechanism is then positioned to reproduce the record to be played.

Having thus described the invention, what is claimed as new and desired to be protected by Letters Patent is—

1. In a phonograph or similar sound producing machines, the combination with the reproducer head, of mechanism for automatically returning the same to its starting position after the completion of the record, means associated with said mechanism for holding the reproducing stylus clear of the record without the position of the reproducer head being disturbed for the purpose of restoring the same to its said starting position, and devices for automatically releasing the reproducing stylus holding means when the said reproducer head has been returned.

2. In combination with mechanism for returning the reproducer head of a phonograph to its starting position for the repeating of the record, of means associated therewith for raising the reproducing stylus clear of the record without disturbing the position of the reproducer head and holding the same so raised until the reproducer head has been restored to its starting position.

3. The combination with the reproducer head of a phonograph or similar sound reproducing machines, of mechanism for mov-

ing the same forward and backward over the record to be reproduced, and means for raising the reproducing stylus clear of the record and holding the same so raised during the return movement of the reproducer head, said means raising the reproducing stylus without disturbing the position of the reproducer head.

4. In a phonograph or similar sound reproducing machines, the combination with the reproducer head, of mechanism for moving the same forward over the record to be reproduced, of means for imparting a reverse movement thereto upon the completion of the record for restoring the said head to its starting position, of devices actuated by said means for raising the reproducing stylus clear of the record without disturbing the position of the reproducer head and holding the reproducing stylus so raised while the head is being returned, and means for releasing the reproducing stylus to place the same onto the record when the head has been returned to its starting position and disconnecting the means for so returning the said head.

5. The combination with means for returning the reproducer head to its original starting position for repeating of a record, of means for automatically raising the reproducing stylus clear of the record without lifting the said reproducer head and holding the reproducing stylus in its raised position during the return movement of the reproducer head, and devices for automatically releasing the holding means to lower the reproducing stylus onto the record to be reproduced upon the reproducer head being restored to its starting position.

6. In a repeating mechanism for phonographs or similar sound reproducing machines, the combination with the diaphragm or reproducer head, of mechanism for returning the same to its starting position without disturbing the position thereof, of means actuated by the driving mechanism for automatically engaging with the returning mechanism, of devices for raising the reproducing stylus and holding the same clear of the record

during the return movement of the diaphragm or reproducer head, and releasing means for disengaging the connecting means between the drive mechanism and the return mechanism when the diaphragm or reproducer head has been returned to its starting position and lowering the reproducing stylus to place the same onto the record.

7. In a phonograph or similar sound reproducing machines, the combination with a feed shaft, having a record cylinder actuated thereby, of a cam collar secured to the shaft, a longitudinally movable traveler which carries the diaphragm or reproducer head, means actuated by the feed shaft for moving the traveler outwardly, an oscillator carried thereby which engages the cam collar to raise said means out of engagement with the feed shaft when the traveler has moved its full outward distance without disturbing the position of the diaphragm or reproducer head, of mechanism actuated by the feed shaft to restore the diaphragm or reproducer head carried by the traveler to its starting point, and devices for holding the reproducing stylus raised and clear of the record during such return movement.

8. In a phonograph or similar sound reproducing machines, the combination with the feed mechanism, of a traveler actuated thereby to move the diaphragm or reproducer head outwardly, mechanism for returning the diaphragm or reproducer head to its starting position after its outward movement, means for automatically engaging said return mechanism to move the diaphragm or reproducer head inward without raising or lifting the same from its position, and a lifting device actuated by said means to lift the reproducing stylus clear of the record and hold the same so raised during the return movement of the diaphragm or reproducer head.

In witness whereof I have hereunto set my hand.

ELAM GILBERT.

In the presence of—

N. A. ACKER,
D. B. RICHARDS.

G. SHEPHARD.
 PHONOGRAPH HORN ATTACHMENT.
 APPLICATION FILED JULY 24, 1908.

912,039.

Patented Feb. 9, 1909.

Fig. 1.

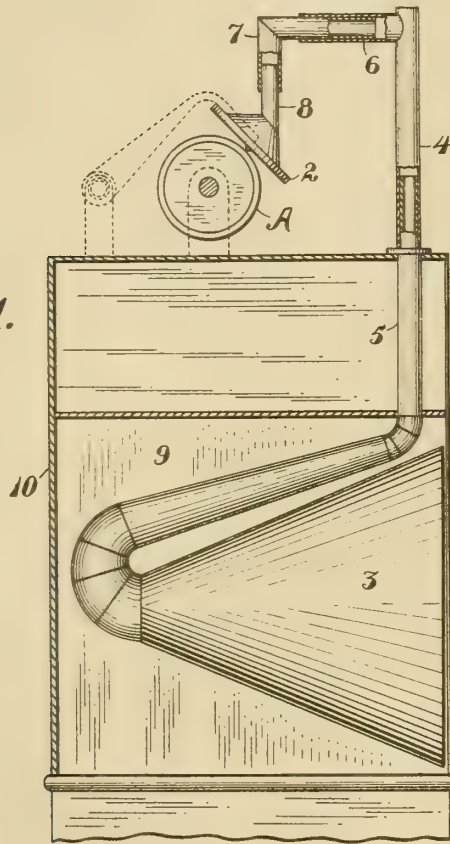
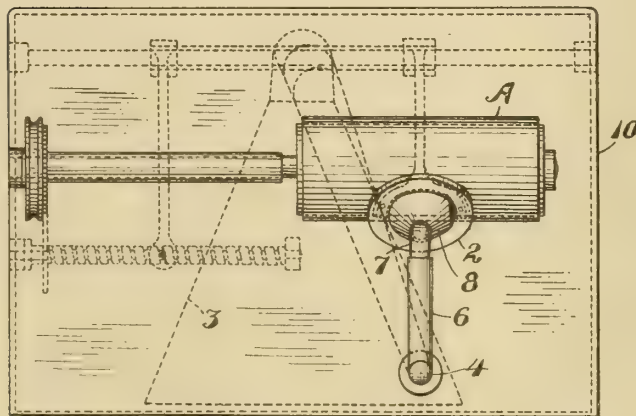


Fig. 2.



WITNESSES

F. L. Thedner
Carverfield

INVENTOR

George Shephard
 BY *Geo. H. Strong*
 ATTORNEY

UNITED STATES PATENT OFFICE.

GEORGE SHEPHARD, OF PETALUMA, CALIFORNIA, ASSIGNOR OF ONE-THIRD TO J. N. WHITE
AND ONE-THIRD TO J. H. ANDREWS, OF PETALUMA, CALIFORNIA.

PHONOGRAPH HORN ATTACHMENT.

No. 912,039.

Specification of Letters Patent.

Patented Feb. 9, 1909.

Application filed July 24, 1908. Serial No. 445,187.

To all whom it may concern:

Be it known that I, GEORGE SHEPHARD, a British subject, residing at Petaluma, in the county of Sonoma and State of California, have invented new and useful Improvements in Phonograph Horn Attachments, of which the following is a specification.

My invention relates to an attachment to talking machines and pertains especially to a means of connecting the horn with the reproducer.

The invention consists of the parts and the construction and combination of parts as hereinafter more fully described and claimed, having reference to the accompanying drawings, in which—

Figure 1 is an elevation in partial section of a talking-machine, showing the invention. Fig. 2 is a plan view of the same.

A represents the reproducing cylinder of a well-known type of talking machine, and 2 is a reproducer provided with the usual stylus to travel in the grooves of the reproducing cylinder in a manner well understood in the art. Suitable means, not necessary here to be shown but also well known, are employed to revolve the cylinder to cause the reproducer to traverse the record endwise.

3 is a horn here shown as housed in chamber 9 of the talking machine casing 10. The horn is supported in any suitable fashion, and in its present arrangement I connect the reproducer with the horn by the following means: A tubular section 4 is adapted to have a telescopic sliding fit with the vertical end section 5 at the small end of the horn. Section 4 has a right angle tubular extension 6 in which an elbow 7 is slidable and turnable. The reproducer 2 has connected to it an elbow 8 with its free end telescoping the corresponding end of the elbow 7. The joints between elbows 7 and 8 and sections 4 and 5 are parallel so as to give horizontal flexibility, and the slip joint between elbows 6 and 7 provides for vertical adjustment and for the necessary extension of the part

6 and 7 in the lengthwise travel of the reproducer along the cylinder A. In other words, the reproducer while always moving rectilinearly and the section 4 pivoting onto section 5, the horn always remains stationary. By this arrangement I get the horn out of sight and out of the way, add to the neatness, appearance, compactness of the machine, and avoid danger of damaging the records as sometimes now occurs by the careless handling of or contact with the horn.

It is manifest that the invention is applicable to records of the disk type as well as to the cylindrical form here shown.

Having thus described my invention, what I claim and desire to secure by Letters Patent is—

1. The combination with the reproducer of a talking machine, and a stationary horn, having a vertically disposed end section, of a tubular section telescopically fitting the end section of the horn and having a right-angled extension, and a flexible connection between said right-angled extension and the reproducer adapted to permit the reproducer to move rectilinearly while the horn remains stationary.

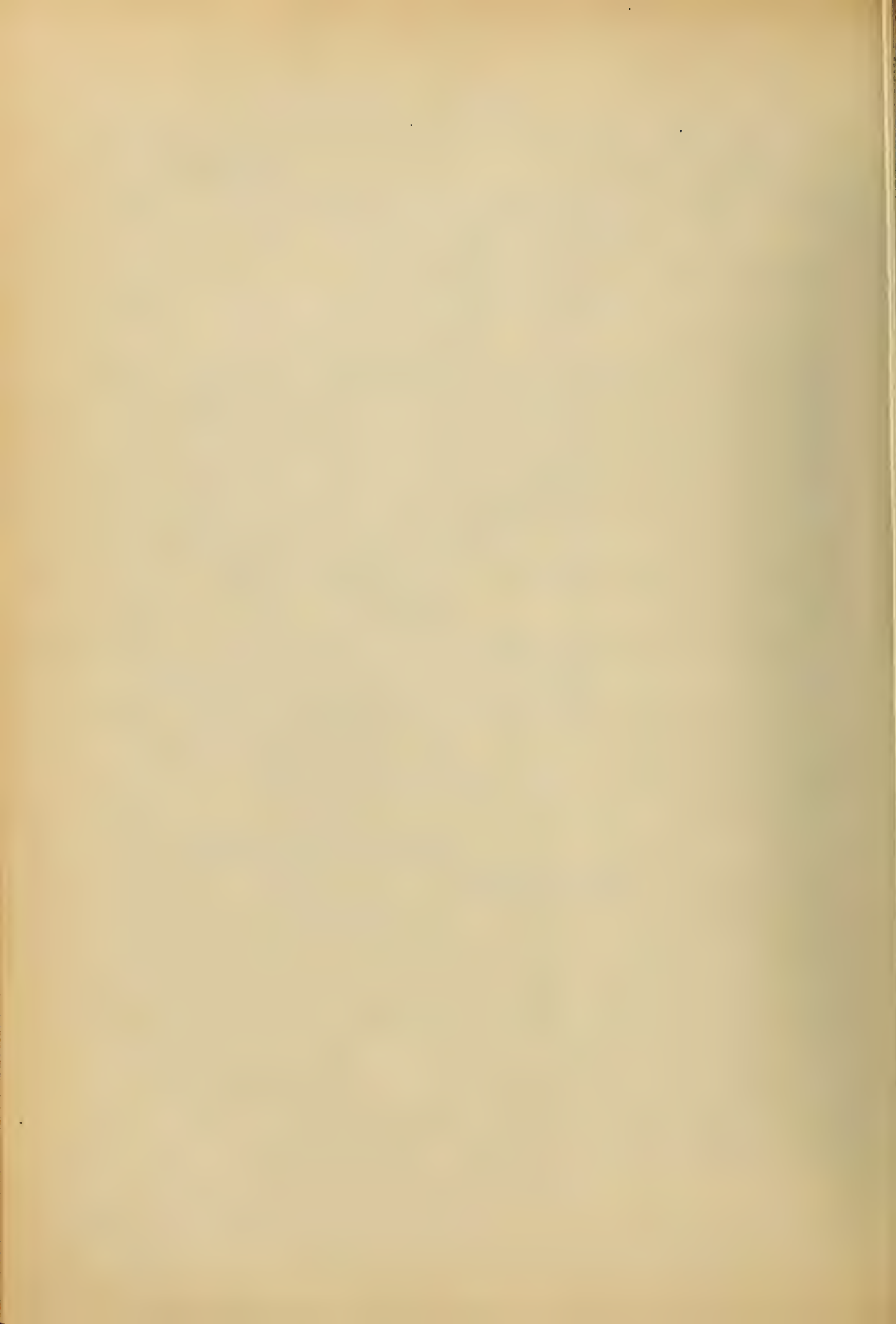
2. The combination with the reproducer of a talking machine a record and a stationary horn, said horn having a vertical end section, of a tubular section telescopically fitting the end section of the horn and having a right-angled extension, an elbow having a horizontal portion telescopically fitting said right-angled extension and having a vertical portion to which the reproducer is telescopically fitted whereby said reproducer may move rectilinearly while the horn remains stationary.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

GEORGE SHEPHARD.

Witnesses:

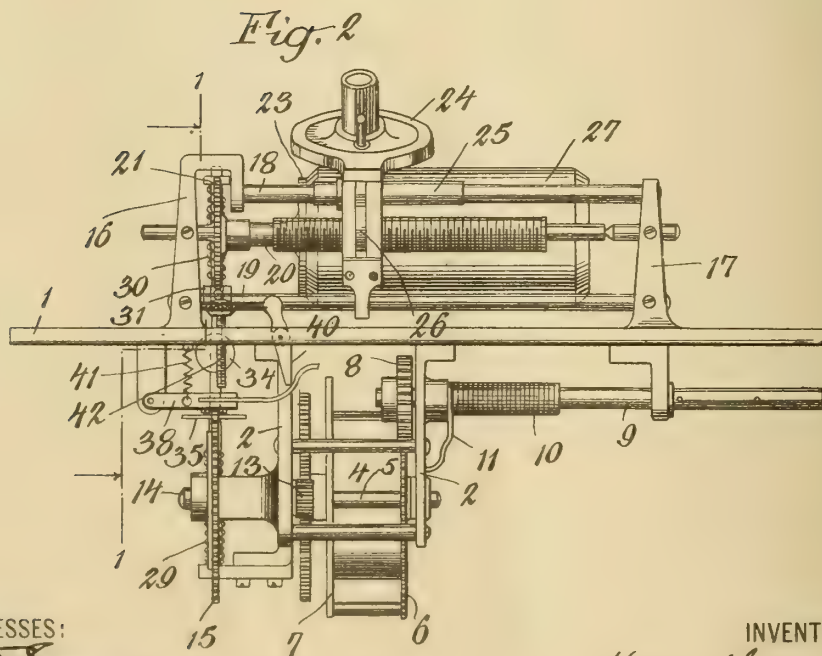
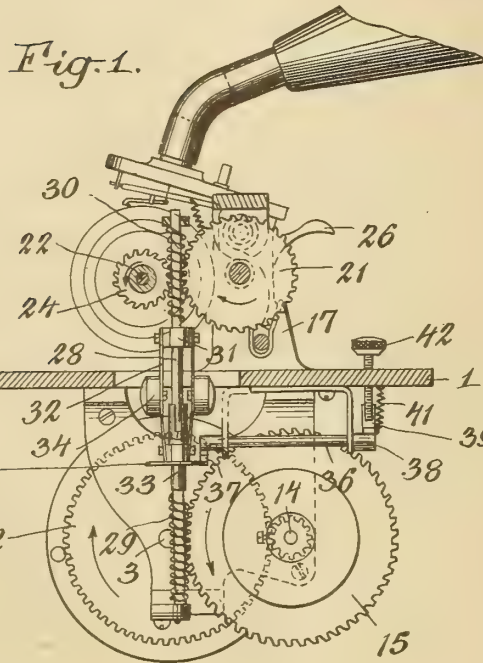
W. M. B. HASKELL,
MABEL MATZENBACH.



H. SHEBLE.
TALKING MACHINE MECHANISM.
APPLICATION FILED MAY 6, 1907.

912,425.

Patented Feb. 16, 1909.



WITNESSES:

H. Edwards
S. Bartlett

INVENTOR

Horace Sheble

BY

H. Edwards

ATTORNEY

UNITED STATES PATENT OFFICE.

HORACE SHEBLE, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO HAWTHORNE & SHEBLE MANUFACTURING COMPANY, OF PHILADELPHIA, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

TALKING-MACHINE MECHANISM.

No. 912,425.

Specification of Letters Patent.

Patented Feb. 16, 1909.

Application filed May 6, 1907. Serial No. 372,057.

To all whom it may concern:

Be it known that I, HORACE SHEBLE, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented a certain new and useful Improvement in Talking-Machine Mechanism, of which the following is a specification.

This invention relates to talking-machines and has reference more particularly to machines of this character employing a record-tablet of cylindrical form. The invention is directed to the improvement of the construction of such machines, with respect especially to the mechanism for transmitting rotary motion from the driving shaft to the shaft on which the record-tablet is mounted, to the end that a structure is provided which may be manufactured at small cost, which is simple and compact, and with which reliable and efficient operation are obtained.

The preferred embodiment of the invention is illustrated in the accompanying drawing, in which—

Figure 1 is a sectional elevation of the machine, the section being on line 1—1 of Fig. 2, and Fig. 2 is an elevation.

Referring to the drawing, 1 indicates a supporting plate on which the parts are mounted, the motor being secured to the under side of this plate and the feed-screw and mandrel being mounted upon the upper side. Plate 1 preferably forms the top of a motor-box which incloses the motor.

Mounted for rotation in suitable bearings 2 depending from plate 1 is a shaft 3 to which is secured one end of a long, flat, spiral spring 4, the other end of which is connected to a rod 5 on a frame consisting of two plates 6 and 7 secured together. These plates are loosely mounted on shaft 3 and one of them, the plate 6, has gear-teeth cut in its periphery with which the teeth of a pinion 8 mesh. This pinion is carried by a shaft 9 mounted in suitable bearings and having its outer end formed to be gripped by a winding handle. A spring 10 is coiled on shaft 9 and has one end 11 secured to one of the bearings therefor; this spring is wound in such direction that a slight backward movement of shaft 9 under the influence of spring 4 tightens it so that it grips shaft 9 and holds it against such backward movement. Shaft 3 to which spring 1 is secured carries a gear 12 which meshes with

a pinion 13 mounted on one end of a shaft 14 adapted to rotate in a suitable bearing formed in the frame depending from plate 1. This shaft carries at its other end a worm-gear 15.

Mounted on the upper side of plate 1 are two brackets 16 and 17 which support two rods 18 and 19 and in which is mounted for rotation a feed-screw shaft 20, the latter carrying a worm-gear 21. In horizontal alinement with the feed-screw is a rod 22 secured to bracket 16 and having a mandrel 23 loosely mounted thereon. A worm-gear 24 is formed on the mandrel 23 directly opposite the gear 21. The reproducer 24 is of any suitable construction and is adapted to slide upon rods 18 and 19, it being supported mainly by a long sleeve 25 loose on rod 18. A movable block 26 is mounted on the frame of the reproducer and has threads cut therein adapted to engage those of the feed-screw 20 to propel the reproducer over the record cylinder 27 supported on mandrel 23.

Mounted for rotation in suitable bearings, one formed in one of the brackets 2 and the other in the bracket 16, is a vertically disposed shaft 28 extending through an opening in the plate 1. At its lower end, this shaft has a worm 29 formed thereon, meshing with the worm-gear 15, and at its upper end a worm 30 is formed on the shaft meshing at one side with the worm-gear 24 for driving the record-cylinder and on the other side with the worm-gear 21 for driving the feed-screw. Secured on shaft 28 is a block 31, to which are secured the upper ends of two flat springs 32, the lower ends of which are secured to a sleeve 33 loose on shaft 28 and adapted to slide freely thereon. These springs 32 carry weights 34 constituting a centrifugal governor. The sleeve 33 has a disk 35 formed thereon.

A rock-shaft 36 is mounted in suitable brackets secured to the under side of the plate 1 and carries a crank 37, on the end of which is a leather buffer adapted to engage one face of the disk 35. Secured to the other end of the rock shaft 36 is a crank 38 having at its end a flat spring 39, with which co-operates a lever 40 pivotally mounted in a slot formed in the base plate 1. A spring 41 is connected at one end to the crank 38 and at the other end to the base plate 1 and operates to rock shaft 36 in a direction to carry the buffer on the end of crank 37 away from

the face of disk 35. By turning lever 40 on its pivot, the shaft 36 may be rocked to carry the end of crank 37 into or out of engagement with the disk 35, in order to start or
 5 stop the operation of the machine. A screw 42 is mounted in an opening in base 1 and its end is adapted to engage the crank 38, so that by means of this screw the position of the end of crank 37 may be adjusted to regu-
 10 late the speed of the motor as desired.

It will be seen that the construction here disclosed is quite simple and compact. The vertically disposed shaft 28 having worms upon its ends, one meshing with a power-
 15 driven gear and the other with gears driving the cylinder and feed-screw, and the arrangement of the governor mechanism upon this shaft, contribute greatly to this simplicity and compactness. For this reason,
 20 the machine can be manufactured at very small cost. Also, the double worm-gearing affords the further advantage that an end thrust in either of the bearings for shaft 28 with the consequent wear in the bearing is
 25 avoided.

Having now described my invention, what I claim as new therein and desire to secure by Letters Patent is as follows:—

1. The combination of a spring-motor, a
 30 shaft driven thereby, a worm-wheel on said shaft, a second shaft, two worms thereon one meshing with said worm-wheel, a rotary support, a rotary screw, means for connecting the other of said worms in driving
 35 relation to said support and screw, and a centrifugal governor mounted on said worm-shaft, substantially as set forth.

2. The combination of a plate, a spring-motor secured to the under side thereof, a
 40 shaft driven thereby, a worm-wheel upon said shaft, a second shaft extending through an opening in said plate, two worms thereon one meshing with said worm-wheel, a rotary support and a rotary screw mounted on the
 45 upper side of said plate, and means for connecting the other of said worms in driving

relation to said support and screw, substantially as set forth.

3. The combination of a motor, a shaft driven thereby, a worm-wheel thereon, a
 50 second shaft, two worms thereon one meshing with said worm-wheel, a support, a worm-wheel thereon, a screw, and a worm-wheel on the shaft of said screw, the other
 55 of said worms upon said second shaft meshing on one side with the worm-wheel on said support and on the other side with the worm-wheel on said screw, substantially as set forth.

4. The combination of a motor, a shaft
 60 driven thereby, a worm-wheel thereon, a second shaft, two worms thereon one meshing with said worm-wheel, a support, a worm-wheel thereon, a screw, a worm-wheel thereon, the other of said worms upon said second
 65 shaft meshing on one side with the worm-wheel on said support and on the other side with the worm-wheel on said screw, and a centrifugal governor on said worm-shaft, substantially as set forth.
 70

5. The combination of a plate, a spring-motor secured to the under side thereof, a shaft driven thereby, a worm-wheel mounted on said shaft, a second shaft extending
 75 through an opening in said plate, two worms on said shaft one meshing with said worm-wheel, a mandrel and a screw mounted on the upper side of said plate, worm-wheels fixed to said mandrel and screw meshing
 80 with the other of said worms on opposite sides thereof, a centrifugal governor on said worm-shaft, and means coacting therewith for regulating the speed at which the motor drives the mandrel and screw, substantially
 85 as set forth.

This specification signed and witnessed this second day of May, 1907.

HORACE SHEBLE.

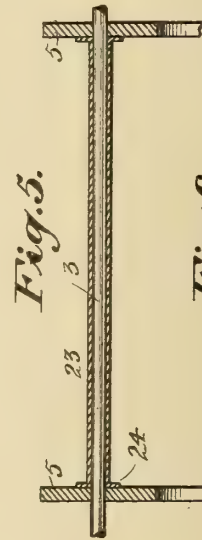
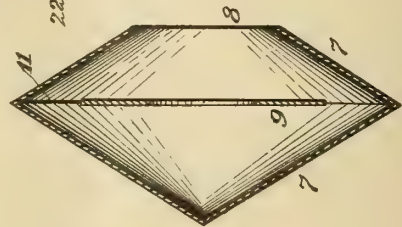
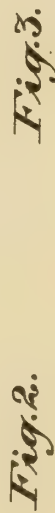
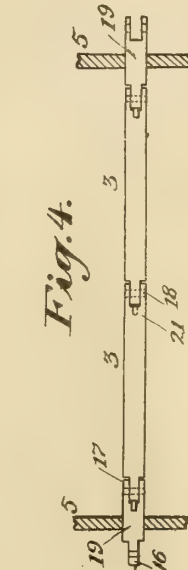
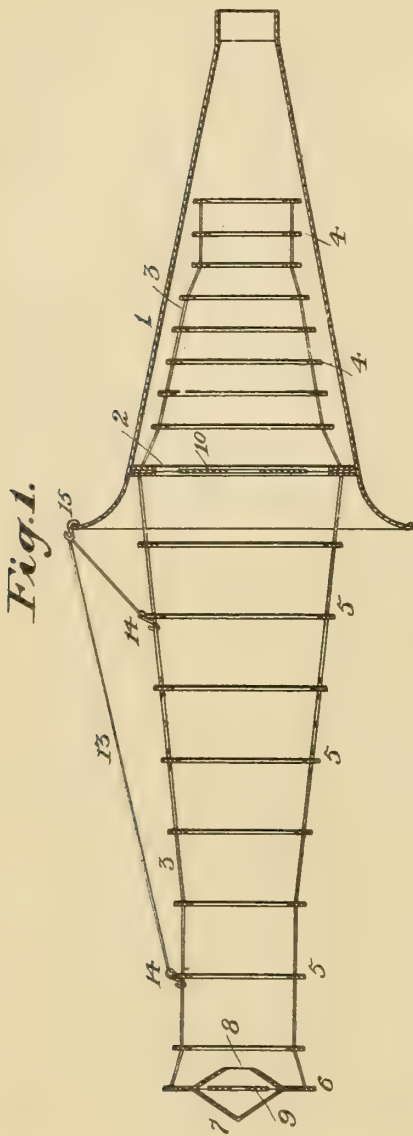
Witnesses:

H. MEIER,
 R. PRODY.

O. G. ROSE.
ATTACHMENT FOR THE HORNS OF SOUND REPRODUCING INSTRUMENTS.
APPLICATION FILED AUG. 28, 1907.

912,735.

Patented Feb. 16, 1909.



WITNESSES:

F. C. Friedner
T. M. Bartel

INVENTOR

Overend G. Rose,
BY *Spear & Seely*
ATTORNEYS.

UNITED STATES PATENT OFFICE.

OVEREND G. ROSE, OF CAMP MEEKER, CALIFORNIA.

ATTACHMENT FOR THE HORNS OF SOUND-REPRODUCING INSTRUMENTS.

No. 912,735.

Specification of Letters Patent.

Patented Feb. 16, 1909.

Application filed August 28, 1907. Serial No. 390,558.

To all whom it may concern:

Be it known that I, OVEREND G. ROSE, a citizen of the United States, residing at Camp Meeker, in the county of Sonoma and State of California, have invented certain new and useful Improvements in Attachments for the Horns of Sound-Reproducing Instruments, of which the following is a specification.

My invention relates to attachments for the horns of sound-reproducing instruments, and in general character, construction and purpose resembles the device described in Letters Patent No. 842,707, granted to me January 29, 1907. In that patent I described a structure composed of a number of connected diaphragms, disks or rings, supported entirely within the horn and adapted to act both as sound projectors and as sound analyzers; the latter term being used to express such a separation or individualizing of the tones of different instruments, or of the voice and accompaniment, or of the solo and chorus whether vocal or instrumental as may be perceived in any original musical rendition. This kind of tone-analysis does not take place in the ordinary unobstructed horns; and so while such horns are necessary for amplifying and giving volume to the tones reproduced, those advantages are obtained at a considerable sacrifice of clearness and delicacy, owing to the production of what might be called "horn-tones" arising in the horn itself. The device described in the said patent was adapted to prevent the formation of such horn-tones and to give the clearness and delicacy of original tones to those reproduced as well as their harmonious shading and blending; but I have found that the devices which are the subject of the present application are still better adapted and still more effective for those purposes. It must not be understood from my use of the term "analysis" or "separation" that the sounds of different instruments are individualized to the detriment of harmony. What I mean is, that just as in the original rendition each kind of instrument has its own appreciable value, at least to a musician, and can be distinguished from the others without at all detracting from the combined harmonious effect, so when my attachment is employed the same instrumental value can be appreciated in the reproduction.

I have herein described a practical embodiment of my invention, and have illustrated the same in the accompanying drawings in which:

Figure 1 is a longitudinal section of an amplifying horn with my attachment in position. Fig. 2 is a rear elevation, partly broken away, of one of the suspended sound-chambers. Fig. 3 is a vertical section of the same. Fig. 4 is a detail view to show the joints by means of which the attachment can be made collapsible. Fig. 5 is a section to show a spacing sleeve between the disks or rings of the kind used when the frame of the attachment is not collapsible. Fig. 6 is a cross section through one of the rods of the frame and a surrounding spacing sleeve.

I have shown at 1 an amplifying horn, which is intended to be illustrative of the various kinds and shapes of horns used with sound-reproducing instruments, such as the ordinary horn of circular cross section, the flower-shaped horn etc. Supported by the horn and extending partly within and partly without the same is my attachment for projecting, analyzing and focusing the sounds reproduced. An annular disk 2 is held in the horn preferably by frictional contact, and is located within but in proximity to the rim or mouth. In order that it may be strong and rigid enough to act effectively as a supporting disk it is preferably formed of two, three or more separate disks, three being shown in the drawing, and such disks being connected together in any suitable manner. Passing through the disk 2 and extending from it in both directions, are wires or rods 3 of any suitable number, three being preferred and two being shown in the drawing. These rods or wires form a supporting frame for the series of disks or rings of which my attachment is composed. By reference to Fig. 1 it will be seen that a number of annular disks or rings 4 are spaced upon the rods 3, and that the greater number of such disks decrease progressively in exterior and also in interior diameter toward the smaller end of the horn, the last three of such disks being, however, preferably of the same diameter both externally and internally. All of the disks 4 although entirely within the horn, are supported out of contact with its inner surface.

Mounted upon those portions of the rods or wires 2 which project outside the horn are

other disks 5, which form a series the members of which for the greater part of its extent decrease progressively in both exterior and interior diameters as shown; the three disks nearest the end disk 6 being however preferably of the same diameters in both dimensions. It will also be observed that the disks 5 are spaced apart at a greater distance from each other than the disks 4. The distance apart of the disks 5 depends upon whether they are upon a scale of five, four, three or two inches, etc., to the foot while the disks 4 vary in their distance apart according to the size of the horn. The final disk 6 which is slightly larger than the disk adjacent to it, may be an imperforate disk like the end disk shown in my patent previously referred to; but I have found that a superior effect is obtained by making the said disk of annular form and suspending within it a focusing chamber 7. This chamber, which is shown in detail in Figs. 2 and 3, is composed of two cones placed base to base the inner cone being truncated and provided with a central opening 8. Suspension wires by which the chamber 7 is supported in the disk 6 are shown in Fig. 2. I prefer to suspend within the chamber 7 and in the plane of the conjoint bases of its two cones an annular disk 9 held in place by the wires 11. I may state at this point that the supporting disk 2 which is shown in Fig. 1 as provided with an interior annular disk 10, may instead be provided with one of the hollow focusing chambers; and also that any of the disks in either series 4 or 5 may be similarly provided.

In order to assist the disk 2 in supporting the projecting part of the attachment and to counteract the tendency to sag and bend which a long attachment may have, I have provided an auxiliary support consisting of a guy 13. This is a cord or wire having at each end a hook 14 and carrying an intermediate adjustable hook 15. The end hooks are engaged with one of the rods or wires 3 at convenient points, and the hook 15 is caught over the rim of the horn, so that the whole projecting part of the attachment is supported in its proper alinement with the horn.

In order that a very long attachment may be rendered more convenient for carriage and transportation, it may be made wholly or partly collapsible; and I have shown one means of accomplishing this in Fig. 4 and have also indicated such means between two of the disks 5 in Fig. 1. The rods 3 are made in sections having at their ends meeting tongues 16 and forks 17 hinged together by transverse pins 18. Each disk is mounted upon a similar but shorter pin 19. At the inner end of each fork is a recess 21, which receives a projecting stop 22 on the adjacent tongue, the construction being such that the joints will be stopped when the rods are

straight, but can be flexed in one direction so that the attachment can be folded together into small compass and brought within or near the mouth of the horn, the disks remaining in their proper planes but in close proximity to each other.

In order to keep the disks properly held and spaced upon the rods 3, I may provide such rods with collars or sleeves which may be strips of sheet metal formed into tubes and pinched or clamped upon the rods. Such a sleeve or collar is shown at 23 in Figs. 5 and 6 as extending from one disk to another and having end flanges 24. When the collapsible rods previously described are employed, such spacing collars or sleeves can also be used, although in that case they would be very short so as not to interfere with the working of the joints of the rods.

All the disks throughout the attachment can be made of any suitable material. I do not exclude metal for the purpose, but better results are obtained from disks of substantially non-resonant material and hence I prefer to use paper, paper-board, wood-fiber, wood itself, or other substances of that general character.

When the attachment is in place and the horn connected to the sound-reproducing instrument, the series of disks within the horn forms a compound diaphragm the members of which take up carry along or project the sounds so that they shall appear to originate at and proceed from the mouth of the horn instead of from its far interior. The amplifying effect of the horn is not interfered with, but with relation to what I have called horn-tones the disks have a silencing or neutralizing effect which entirely does away with the blurred or grating tones which are always to be perceived when horns of the ordinary kind are employed. The tones, thus purified, are delivered at the mouth of the horn and are then taken up, carried forward and analyzed by the exterior series of disks, the sound of each instrument being given off at the same relative distance from the sounds of the other instruments that it was when the piece was recorded, until the finer instruments such as the clarinet are finally focused and delivered at or from the focusing chamber 7. The arrangement of the external disks bears a definite relation to the arrangement which the musical instruments or voices bore to the recorder; and the analysis or separation of tones by the external disks can be readily demonstrated by listening close to and behind any of those disks. Thus the tones of an instrument which was located nearest the recorder, as a clarinet, can be clearly distinguished by listening in behind the chamber 7 or the disk next to it. In contrast with this trombone tones can be distinguished by listening in behind the external disk nearest the mouth of the horn. At

intermediate disks can be similarly distinguished tubas and altos, fifes and drums and other instruments. In songs and solo pieces,

the human voice or the violin, mandolin,
5 cornet, orchestra bells etc., are given off
from the focusing-chamber 7, while the accompaniment is given off at or near the
mouth of the horn, being separated from the
voice or instruments a greater or less relative
10 distance according as the disks 5 are made on
the scale of five, four, three, two inches, etc.,
to the foot; the larger the scale the better being
the results. Such separation of tones,
thus capable of demonstration, is evidence
15 of the fact that there is a real reproduction
of the original with all its clearness and delicacy;
while the projection of the tones outside
the horn does away with any blurring or
muffling effect of the latter. In this improved
20 effect the two series of disks one within
and the other without the horn both coöperate;
the inner series acting to silence the horn-tones
and to deliver pure tones to the outer series,
and the latter taking up and
25 projecting such pure tones and analyzing and
separating them in the manner described so
as to preserve their musical individuality and
delicacy. I therefore prefer to use both
series of disks; but as I have found in practice
30 that it is possible to obtain very good tones
when the external series is used alone, I do not
wish to confine myself to the employment of
both series in all cases. The reproduced tones
thus individualized are focused at their
35 respective rings by the end disk 7 and are
delivered with all the harmony, purity and
delicacy of the original rendition. The
amplifying effect of the horn remains, but its
blurring, muffling and grating tendencies are
40 removed, the tones as finally and externally
delivered having been practically freed from what
was objectionable in its influence.

I do not limit myself to the specific constructions
45 and arrangements herein described and shown
in the drawings, as I desire to avail myself of
such modifications and equivalents as fall properly
within the spirit of my invention.

50 What I claim is:

1. In combination with the horn of a sound-reproducing instrument, a plurality of
connected annular disks supported by the
horn and projecting beyond its mouth.

55 2. In combination with the horn of a sound-reproducing instrument, a plurality of
annular disks connected together and supported
partly within the horn and partly without the same.

60 3. In combination with the horn of a sound-reproducing instrument, a disk within
and near the rim or mouth of said horn and
in contact with its interior surface, and a series
of disks connected together and to said
65 first-named disk, one series extending into

the horn and the other extending outwardly from the horn.

4. In combination with the horn of a sound-reproducing instrument, a disk in contact
70 with the inner surface of said horn near its
mouth or rim, a series of disks within and out
of contact with the horn connected together
and to said first-named disk, and a series
of disks outside the horn connected together
75 and to said first-named disk.

5. In combination with a horn for the described
purpose a supporting disk within the same
near its mouth and in contact with its inner
surface, a number of disks within the horn
of progressively decreasing diameter
80 connected together and to said supporting disk,
and a number of disks without the horn and
of progressively decreasing diameter, connected
together and to said supporting disk.

6. An attachment for horns of the character
described, having an annular supporting disk,
a series of annular disks connected thereto
and to each other and adapted to extend
from said supporting disk within the
90 horn, and a series of annular disks connected
to the supporting disk and to each other and
extending from the supporting disk to a point
beyond the mouth of the horn; the disks of
both series being of progressively decreasing
95 diameters both exteriorly and interiorly.

7. An attachment for horns of the described
character, having an annular supporting disk,
a series of disks connected together and to
said supporting disk and adapted to extend
within the horn, and a series of disks
100 connected together and to the supporting disk
and extending to a point beyond the mouth
of the horn; the disks of the inner series
being closer together than the disks of the
outer series.

8. In combination with the horn of a sound
reproducing instrument, a structure composed
of a plurality of annular disks connected
110 together and supported by the horn; such
structure being of such length relatively to
the length of the horn that a part of it
projects outside of the horn.

9. In combination with the horn of a
115 sound reproducing instrument, a disk of
such diameter relatively to the horn as to
come into contact with its inner surface adjacent
to its mouth or rim, and a series of disks
connected together and to said first-named
120 disk at one side of the latter, whereby
said series of disks is caused to project
outwardly from the horn.

10. In combination with the horn of a
125 sound reproducing instrument, a disk of
such diameter relatively to the horn as to
come into contact with its inner surface adjacent
to its mouth or rim, a series of disks
connected together and to said first-named
130 disk at one side of the latter, and a series of

disks connected together and to said first-named disk at the other side of the latter; whereby one series of disks is caused to extend outwardly from the horn and the other inwardly within the horn.

11. In an attachment of the character and for the purpose described, an annular disk, an open hollow sound chamber inclosed thereby, and a disk supported within the sound chamber.

12. In an attachment of the character and for the purpose described, an annular disk and a hollow sound-chamber within the same.

13. In an attachment of the character and for the purpose described, an annular disk, a hollow sound-chamber inclosed thereby, and an annular disk within said sound-chamber.

14. In an attachment of the character described, an annular disk, and a hollow sound-chamber within the same; said chamber being of double conical form having one face truncated and provided with an opening.

15. In an attachment for horns of the kind described, a plurality of disks, rods connecting said disks together, and joints in said rods whereby they can be flexed and straightened.

16. In an attachment for horns of the kind described, a plurality of disks, rods connecting said disks together, and spacing sleeves secured upon said rods adjacent to said disks.

17. In an attachment for horns of the kind described, a series of disks adapted to project beyond and outside of the horn, rods connecting said disks together, a guy connected to one of said rods, and an adjustable hook for connecting said guy to the horn.

In testimony whereof I have affixed my signature in presence of two witnesses, this fourteenth day of August, 1907.

OVEREND G. ROSE.

Witnesses:

JAMES J. BUNNER,
LAWRENCE B. SELENGER.

T. KRAEMER.
SOUND BOX FOR TALKING MACHINES.
APPLICATION FILED AUG. 5, 1907.

912,857.

Patented Feb. 16, 1909.

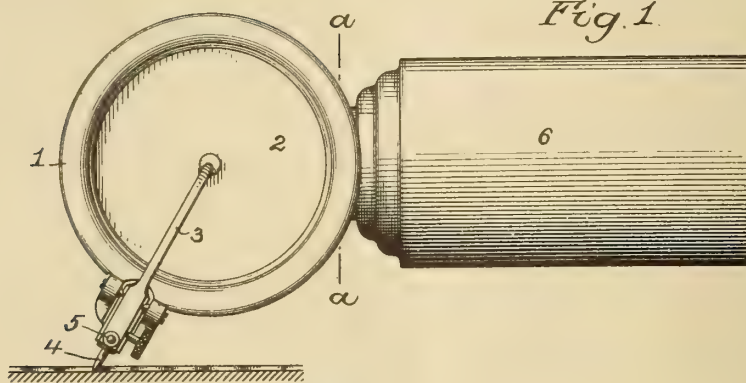


Fig. 1.

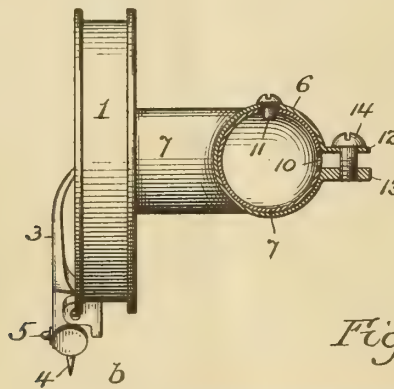


Fig. 2.

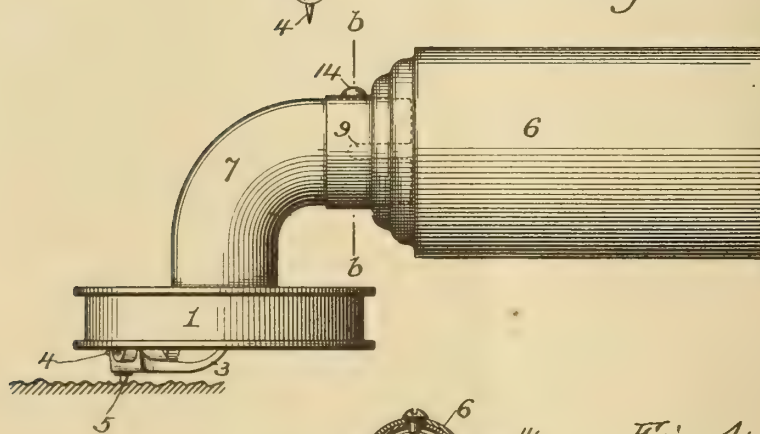


Fig. 3.

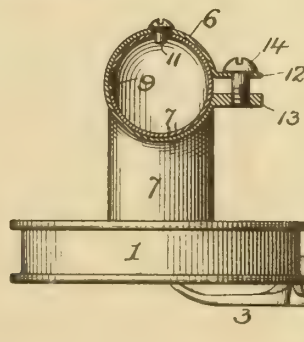


Fig. 4.

Witnesses
Hamilton D. Turner
Kate A. Beadle

Inventor
Thomas Kraemer
by his Attorneys
Smith & Prazier

UNITED STATES PATENT OFFICE.

THOMAS KRAEMER, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO HAWTHORNE & SHEBLE MANUFACTURING COMPANY, OF PHILADELPHIA, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

SOUND-BOX FOR TALKING-MACHINES.

No. 912,857.

Specification of Letters Patent.

Patented Feb. 16, 1909.

Application filed August 5, 1907. Serial No. 387,193.

To all whom it may concern:

Be it known that I, THOMAS KRAEMER, a citizen of the United States, residing in Philadelphia, Pennsylvania, have invented certain Improvements in Sound-Boxes for Talking-Machines, of which the following is a specification.

The object of my invention is to so construct a sound box for talking machines that it can be used in connection with records either of the lateral-wave or hill-and-valley type. This object I attain in the manner hereinafter set forth, reference being had to the accompanying drawing, in which,
Figure 1 is a front elevation of a talking machine sound box and part of the hollow arm carrying the same, the sound box being adjusted for use in connection with a record of the lateral-wave type; Fig. 2 is a view, partly in elevation and partly in transverse vertical section, on the line *a-a*, Fig. 1; Fig. 3 is a view similar to Fig. 1, but showing the sound box adjusted for use in connection with a record of the hill-and-valley type, and Fig. 4 is a view, partly in elevation and partly in transverse section, on the line *b-b*, Fig. 3.

1 represents the casing of the sound box and 2 the diaphragm, which may be supported therein in any desired way, the stylus lever 3 bearing upon said diaphragm and being pivotally mounted upon the sound box casing so as to vibrate in a plane at a right angle to the plane of the diaphragm, constant contact of the inner end of the stylus lever with the diaphragm being maintained by securing these parts directly together.

One feature of my present invention consists in providing the stylus lever with two styluses 4 and 5, the stylus 4 projecting from the end of the lever so as to engage with a record having grooves of the lateral-wave type, as shown in Fig. 1, and the stylus 5 projecting from the back of the lever so as to engage with records having grooves of the hill-and-valley type, as shown in Fig. 3, whereby either type of record will cause vibration of the stylus lever in its proper plane of movement.

The stylus 4 may consist of the ordinary steel needle used in connection with the hard composition records usually employed in disk record talking machines, but as the stylus 5 may sometimes, if not usually, be employed in connection with cylindrical wax

records it is preferably composed of the conventional sapphire point commonly used in machines of that type, wherein the operating end is blunt or rounded.

The hollow arm of the talking machine is represented at 6, and in order to permit of the ready application of the sound box to said arm so that either stylus may be used, the tube 7 projecting from the back of the sound box is bent into elbow form, as shown in Fig. 3, one end portion of said tube engaging the end of the arm 6 and being adjustable to different positions therein, in order to permit the sound box to assume either the relation to the arm 6 shown in Figs. 1 and 2, for the use of the stylus 4, or the relation shown in Figs. 3 and 4, for the use of the stylus 5.

Preferably the elbow tube 7 of the sound box is of circular cross section, and that portion of the same which engages the end of the arm 6 has formed in it two slots 9 and 10 for the reception of a pin 11 carried by the arm 6, the slots being so disposed that when said pin engages the slot 9 the sound box will occupy the position shown in Figs. 1 and 2, and when it engages the slot 10 the sound box will occupy the position shown in Figs. 3 and 4, and will be locked in either position of adjustment.

In order to insure at all times a snug fit of the elbow pipe to the arm 6 the tubular end portion of said arm, which receives the end of the elbow pipe, is preferably split and provided with flanges 12 and 13, which are connected by a set screw 14, as shown in Figs. 3 and 4, whereby said split portion of the arm 6 can be caused to press upon the end of the elbow pipe 7 of the sound box with any desired degree of force.

I claim:

1. A talking machine sound box having a diaphragm, and a pivoted stylus lever bearing on the diaphragm on one side of the fulcrum, and provided on the opposite side of said fulcrum with one stylus constructed for engagement with a record of the lateral wave type and another stylus constructed for engaging a record of the hill-and-valley type, said latter stylus having a rounded operating end.

2. A talking machine sound box having a diaphragm, and a pivoted stylus lever bearing on the diaphragm on one side of the fulcrum and provided on the opposite side of

said fulcrum with two styluses, one projecting in a plane parallel with the diaphragm and constructed for engaging a record of the lateral-wave type and the other projecting in a plane at a right angle to said diaphragm and constructed for engaging a record of the hill-and-valley type, said latter stylus having a rounded operating end.

3. A talking machine sound box having a diaphragm, and a pivoted stylus lever bearing on the diaphragm on one side of the fulcrum and provided on the opposite side of said fulcrum with one stylus projecting from the end of the stylus lever and constructed for engaging a record of the lateral-wave type, and another stylus projecting from the back of the lever and constructed for engaging a record of the hill-and-valley type, said latter stylus having a rounded operating end.
4. The combination of the hollow sound-box-carrying arm of a talking machine, with a sound box having a stylus lever provided with a plurality of styluses disposed at different angles, one constructed for engagement with a record of the lateral-wave type, and the other constructed for engagement with a record of the hill-and-valley type, said latter stylus having a rounded operating end, and means for adjustably mounting the

sound box on its carrying arm to accord with the different positions in which the stylus lever must be used.

5. The combination of the hollow sound-box-carrying arm of a talking machine with a sound box having a stylus lever susceptible of use in different positions, an elbow tube whereby said sound box is connected to its carrying arm, and means for securing said elbow tube to the carrying arm in different positions of adjustment.

6. The combination of the sound-box-carrying arm of a talking machine with a sound box having a stylus lever susceptible of use in different positions, and an elbow tube having a pair of slots, each adapted for the reception of a projection on the carrying arm.

7. The combination of a talking machine sound box having a stylus lever susceptible of use in different positions, a tube on said sound box, and a carrying arm having a clamping portion for engaging said tube.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

THOMAS KRAEMER.

Witnesses:

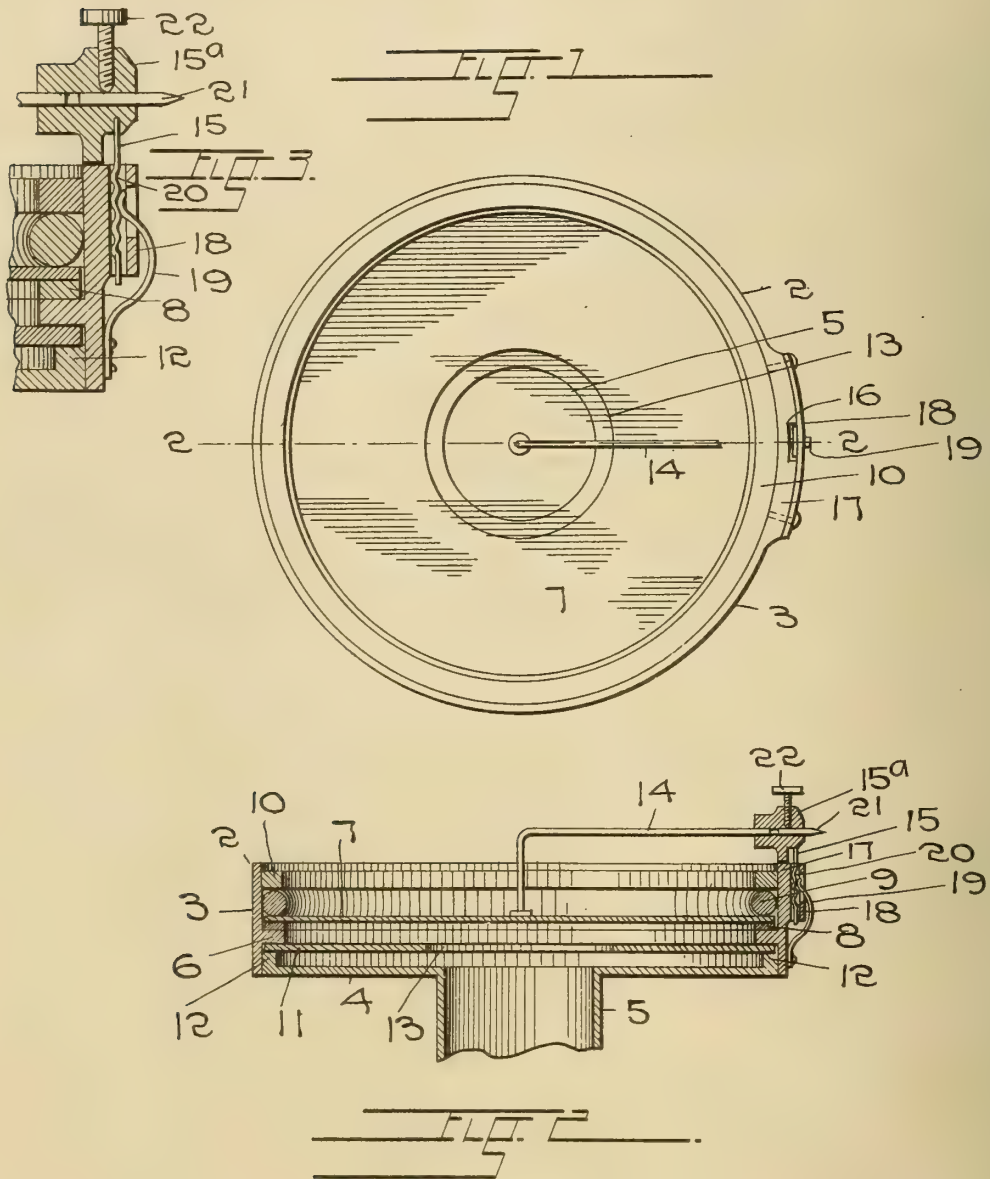
HAMILTON D. TURNER.

KATE A. BEADLE.

G. OSTEN.
SOUND BOX.
APPLICATION FILED MAY 20, 1908.

913,153.

Patented Feb. 23, 1909.



WITNESSES:

J. H. Johns
R. M. Stump

INVENTOR.

George Osten

BY

G. J. Williams
ATTORNEY.

UNITED STATES PATENT OFFICE.

GEORGE OSTEN, OF DENVER, COLORADO.

SOUND-BOX.

No. 913,153.

Specification of Letters Patent.

Patented Feb. 23, 1909.

Application filed May 20, 1908. Serial No. 433,815.

To all whom it may concern:

Be it known that I, GEORGE OSTEN, a citizen of the United States of America, residing at Denver, in the county of Denver and State of Colorado, have invented certain new and useful Improvements in Sound-Boxes, of which the following is a specification.

This invention relates to certain new and useful improvements in the sound boxes which form part of the sound-reproducing instruments, commonly known as phonographs and its object is to provide a device of the class named which, by its peculiar construction and the addition of an auxiliary diaphragm, will reproduce sound clearer, more distinct and sonorous than in constructions heretofore known. I attain this object by the mechanism illustrated in the accompanying drawing in the various views of which like parts are similarly designated and in which—

Figure 1—represents a face view of the improved sound box, Fig. 2—a section taken along a line 2—2, Fig. 1, and Fig. 3—an enlarged, fragmentary sectional view of the needle holder and adjacent parts.

In constructing the improved device, I employ a cylindrical box 2 which comprises an annular portion 3 and a plate 4, which, being fitted in one of the ends thereof, is provided with an outwardly extending, central tubular conduit 5, through which the sounds, reproduced by the vibratory movement of the diaphragms, are transmitted to the horn with which it connects. The portion 3 is formed with an interior, annular flange 6 which supports the diaphragm 7 between two rubber packing rings 8 and 9, the outer one of which is engaged by a split ring 10 which, by frictional contact with the internal surface of the member 3 of the box, holds the diaphragm in place. A second diaphragm 11, composed of a suitable metallic substance, is held between the first named diaphragm 7 and the plate 4 and in spaced relation thereto, by engagement with the opposite side of the flange 6 and an inwardly extending peripheral rim 12 on the plate 4. The auxiliary diaphragm 11 has a central opening 13, through which the sound produced by the principal diaphragm 7, which is usually composed of mica, may pass into the orifice of the tubular conduit 5 of the plate 4. The opening 13 is preferably made larger than the therewith axially

aligned orifice of the conduit so that the sounds produced by the diaphragm 7, may pass between the plate 4 and the auxiliary diaphragm 11, to impart a vibratory movement to the latter.

The needle bar 14, one extremity of which engages the outer surface of the diaphragm 7, projects, at its opposite end, into an opening in the head 15^a of the needle holder 15, which extends through a slot formed by a depression 16 in a boss 17 on the annular member 3, and a thereto secured strap 18, and which is adjustably held in place by means of a spring catch 19 which, being secured at one of its extremities upon the peripheral surface of the box, projects through an opening in the strap 18, to engage, with its free extremity, one of a plurality of notches 20 formed in the holder 15. The needle 21 is secured in an opening in the head 15^a, in alinement with the bar 14, by means of a set screw 22.

The advantages derived from the use of the improved sound box will be readily understood by those familiar with the art.

As the needle 21 travels through the groove in the rotating cylinder or disk of the phonograph, the mica diaphragm is set in vibration and the sound waves, produced by this vibratory movement, are propagated to the metallic diaphragm 11 which in consequence, receives a vibratory motion in unison with that of the principal diaphragm and thereby amplifies the undulations which, being augmented by those passing directly through the opening 13 in the diaphragm, into the conduit 5, will cause the sounds emitted from the horn, connected therewith, to be clear, distinct and sonorous. By making the opening 13 larger than the orifice of the conduit, the passage of the waves of vibration into the space between the auxiliary diaphragm 11 and the plate 4, is greatly facilitated. The diaphragm 11, the thickness of which is equal to or less than that of the mica diaphragm, is preferably positioned midway between the latter and the plate 4 at equal distances therefrom, the distances between the members being determined by the nature and thickness of the metallic substance of which the auxiliary diaphragm is composed.

Having thus described my invention what I claim is:

1. In a device of the class named, the combination of a sound box open at one of its ends, a sound transmitting conduit connect-

ing with its opposite end, a diaphragm within the box and an auxiliary, flexible, metallic diaphragm interposed between the first named diaphragm and the said conduit, and
5 having an opening opposite to and of greater diameter than the orifice of the latter.

2. In a device of the class named, the combination of a sound-box open at one of its ends, a sound transmitting conduit connected with an opening in its opposite end, a
10 diaphragm within the box and an auxiliary diaphragm interposed between the first named diaphragm and the conduit and having, opposite the said opening, an aperture
15 whose area is not less than that of the said orifice.

3. In a device of the class named, the combination of a sound box open at one of its ends, a sound transmitting conduit connected with a central opening in its opposite
20 end, a diaphragm within the box and an auxiliary flexible, metallic diaphragm interposed between the first named diaphragm and the closed end of the box in proximity to
25 the latter and having a central aperture of greater diameter than the said opening.

In testimony whereof I have affixed my signature in presence of two witnesses.

GEORGE OSTEN.

Witnesses:

G. J. ROLLANDET,   

K. M. STUMP.

UNITED STATES PATENT OFFICE.

HANSON C. KELLY, OF WEST BURLINGTON, IOWA.

ATTACHMENT FOR GRAPHOPHONES.

No. 913,508.

Specification of Letters Patent.

Patented Feb. 23, 1909.

Application filed June 17, 1908. Serial No. 439,059.

To all whom it may concern:

Be it known that I, HANSON C. KELLY, a citizen of the United States, residing at West Burlington, in the county of Des Moines and State of Iowa, have invented certain new and useful Improvements in Attachments for Graphophones, of which the following is a specification.

My invention relates to an improvement in attachments for graphophones, and the object is to provide means whereby the particles of dust caused by the needle of the graphophone as it becomes worn to be gathered off from the disk or record, thereby preventing metal from working into the records, and thus preserving the record. This manner of gathering up the particles will also overcome the scratching which is often caused after the record has been used for any length of time.

The invention consists of certain novel features of construction and combinations of parts which will hereinafter be described and pointed out in the claims.

In the accompanying drawings Figure 1 is a view showing my invention applied to the graphophone; Fig. 2 is a view of the bracket for holding the magnet, and Fig. 3 is a detail.

A, represents a graphophone of the ordinary type, and 1 is an arm of the graphophone upon which the horn 2 is mounted and to which the needle 3 is connected. A bracket 4 is connected to the arm 1 of the graphophone by means of a clamp 5, which clamp is preferably made integral with the bracket. The bracket 4 at its forward end extends upwardly as at 6, and then extends outwardly or forwardly to form the loop 7. Between the ends and in the loop of the bracket a magnet 8 is placed, which is held in the loop by a thumb screw 9. The magnet is adjustably held in the loop so that it can be supported a certain distance above the record or disk. The magnet is held sufficiently above the disk or record so that there is no possible contact between the disk and

magnet, but the magnet is merely a sufficient distance above the disk so that all particles of the metal from the wear of the needle can be attracted and taken up by the magnet from the disk or record.

From the foregoing it will be seen that I have provided a means whereby records can be preserved and all particles of metal from the needle can be taken up by the magnet, and thereby prevent metal from being ground into the disk or record, and at the same time by taking up these particles the scratching which is caused by the needle in many instances is obviated.

It is evident that slight changes might be made in the form and arrangement of the several parts described without departing from the spirit and scope of my invention, and hence I do not wish to be limited to the exact construction herein set forth, but:

Having fully described my invention, what I claim as new and desire to secure by Letters Patent is:—

1. An attachment for graphophones, comprising a magnet, and means for supporting the magnet in the rear of the stylus for directly gathering up the particles of metal from the record.

2. An attachment for graphophones comprising an arm, a bracket clamped to the arm, said bracket having a loop formed therein, and a magnet adjustably held in the loop of the bracket for collecting all particles of metal from the record.

3. An attachment for graphophones comprising an arm, a bracket connected to the arm, said bracket being off-set and having a loop formed at one end, and a magnet held in the loop of the bracket for collecting particles of metal from the records.

In testimony whereof I affix my signature in presence of two witnesses.

HANSON C. KELLY.

Witnesses:

CHAS. T. FISHER.

CLAUDE JAMES SCHUBERT.

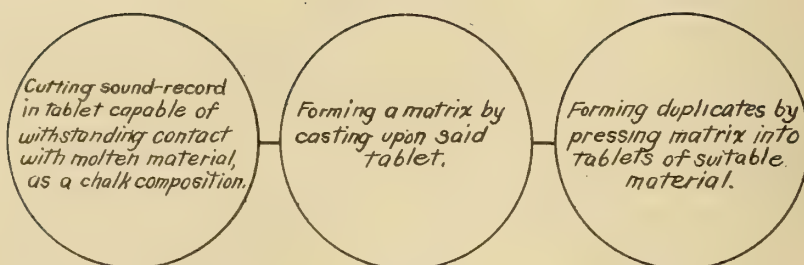
J. O. PRESCOTT & L. J. SCHRAMEK.

PROCESS OF MAKING SOUND RECORDS.

APPLICATION FILED FEB. 27, 1907.

913,765.

Patented Mar. 2, 1909.



WITNESSES:

H. Edmunds.
J. B. Smith

INVENTORS

J. O. Prescott &
L. J. Schramek,

BY

J. C. Edmunds
ATTORNEY

UNITED STATES PATENT OFFICE.

JOHN O. PRESCOTT, OF SUMMIT, NEW JERSEY, AND LOUIS J. SCHRAMEK, OF NEW YORK, N. Y.

PROCESS OF MAKING SOUND-RECORDS.

No. 913,765.

Specification of Letters Patent.

Patented March 2, 1909.

Application filed February 27, 1907. Serial No. 359,700.

To all whom it may concern:

Be it known that we, JOHN O. PRESCOTT, a citizen of the United States, residing at Summit, in the county of Union and State of New Jersey, and LOUIS J. SCHRAMEK, a citizen of the United States, residing in the city, county, and State of New York, have invented certain new and useful Improvements in Processes of Making Sound-Records, of which the following is a specification.

The object of this invention is to provide an improved process of producing duplicate sound-records from an original record having a record-groove cut therein in any suitable manner, as by means of a cutting stylus vibrated by sound waves while traveling over the record.

The invention relates more particularly to the production of duplicate sound-records of the disk type having a laterally undulating record-groove therein but is not limited in this respect.

The process of manufacture of duplicate sound-records of the disk type as heretofore practiced has involved cutting the record-groove in a tablet of waxy composition, coating the surface of this original record with a conducting substance and then electroplating thereon to form a matrix. This matrix could then be pressed into a tablet of a suitable substance when reduced, as by heat, to a plastic or semi-plastic condition to form a duplicate; but the process as commercially practiced, has involved certain intermediate steps, including the making by an electroplating process of what is termed a "duplicate original" and making from this, again by electroplating, another matrix which is used for pressing duplicates, the purpose of these steps being to provide a metallic record tablet for making other pressing matrices when the one first made becomes worn by frequent use. The employment of this process is open to several objections. Among others, the operation of electroplating is laborious and time-consuming, requires great care and a high degree of skill; for instance, the application of plumbago or a similar substance to the original sound-record to make its surface electro-conductive requires considerable time and the exercise of great care, since if this substance is too thick in any part of the record-groove, the matrix obtained from the record will be im-

perfect. In the process above outlined, the operation of electroplating is performed three times.

Our improved process involves the provision of a tablet in which the original sound-record is cut differing from those heretofore used in that it will withstand changes of temperature of considerable degree without injury. Important advantages are secured by the use of such an original sound-record rather than a record as heretofore made consisting of wax or a waxy substance, in making duplicate records by the electroplating process. With the wax records, the greatest care is necessary in handling them and even when such care is taken, breakage and cracking of the records frequently occur before the electroplated matrix can be made, such breakage and cracking involving considerable loss, particularly in cases where a selection by a well-known artist is recorded on the record. Thus, the temperature of the solution in the electroplating bath is usually lower than that of the atmosphere and the change in the temperature of the record when it is immersed in the bath is very apt to cause cracking. Also the temperature of the record must not be raised too much since otherwise the wax of the groove wall would become softened and the undulations therein lost. By the employment of a record made of such material that will withstand changes of temperature of considerable degree without injury, these objections are overcome, breakage and cracking of the valuable original records are minimized and such great care in handling them is unnecessary. The provision of such original records also permits of employing a process of making duplicates therefrom in which one or all of the objectionable electroplating operations are omitted. With such original records, the matrix may be obtained by the simple process of casting upon the original record, a material saving in time, skilled labor and the cost of producing duplicates being thus effected. With the tablets of waxy composition in which the record is cut as heretofore employed, such a method of making a matrix cannot be followed, as obviously, the record would be spoiled as soon as the molten metal came into contact therewith. By making the tablet of chalk or such other substance as may be used for a record tablet

and will withstand a comparatively high degree of heat, the process of casting may be employed in making the matrix and the advantages resulting therefrom thus secured.

5 The steps in the process of making duplicate records subsequent to the making of the matrix may be varied somewhat and may, if found desirable, include one or more operations of electroplating to obtain a duplicate matrix for pressing. We may, however, in accordance with our invention, make a duplicate of the original by pressing the matrix into a suitable tablet and this tablet may be of a material capable of withstanding a high degree of heat so that duplicate matrices may be formed therefrom by casting.

10 We will now describe more in detail the preferred method of practicing our improved process, it being understood that in many of these details the process may be varied. The tablet is first prepared from a very fine chalk powder. This is held together by a suitable binder which may consist of glycerin and glue and, if desired, a small amount of gelatin. When the powder and the binder have been thoroughly mixed, a suitable quantity is subjected to heavy pressure in a shallow circular form to cause the material to take the shape of a thin disk. The sound-record is then cut in one face of the disk in the usual manner by causing a cutting stylus to vibrate in accordance with sound waves while the disk and stylus are moving relatively. Since the disk consists of impalpable chalk powder, the vibrations of the cutting stylus are faithfully preserved in the walls of the groove and the record when completed can be subjected to a considerable degree of heat without danger of injury to the groove walls. A matrix is now formed from the original record by flowing metal thereon and for this purpose, the record may be placed in a circular (or annular if the record is of annular shape) receptacle to confine the fluid material so that the completed matrix will be of circular or annular shape. Preferably typemetal reduced to a molten state by heat is used for this purpose, a casting being thus made from the record to form the matrix, as this metal will readily flow into and completely fill the record-groove and preserve, in reverse, all the sinuities thereof when the matrix is removed from the record. Other metals, however, may be used with good results. A duplicate of the original record is then formed from the matrix and this may be done by electroplating. Preferably, however, the matrix is pressed into a disk of a suitable composition reduced to a semi-plastic condition, such for instance as fine clay. When the material of the disk has hardened and the matrix has been withdrawn, a duplicate of the original record is

obtained made of such material that it can readily withstand, without injury, the heat to which it would be subjected by casting thereon. The duplicate matrix is then formed by casting upon this duplicate original and duplicate sound-records can be made from this matrix by pressing in the usual manner.

By this process, one or all of the expensive operations of electroplating may be entirely eliminated and duplicate records equally as good as those made by the process heretofore practiced are obtained. Furthermore, less time is required to produce the duplicate records as the original record is ready to have the matrix formed thereon as soon as it is cut and as the casting operation requires much less time than electroplating.

The steps in our process are illustrated diagrammatically in the accompanying drawing forming a part hereof.

We do not wish to be understood as limited to the use of a process involving all the detail features set forth herein, as many departures from the process as we prefer to employ it can be made within the scope of our invention. Thus, the process of making an original record as above described may be employed although the matrix is made therefrom by electroplating and the process of making a matrix by flowing a metal upon the original record may be performed in other ways than that herein described as the preferred method. All such modifications of our process we consider within the scope of our invention and we aim to cover them by the terms of the claims appended hereto.

Having described our invention what we claim as new and desire to obtain by Letters Patent is:

1. The process of making sound-records which consists in forming a record-tablet of a material capable of withstanding contact with molten material without injury, supporting a recording stylus in contact with said tablet and moving said stylus and tablet relatively, vibrating said stylus in accordance with sound-waves while in engagement with and moving relatively to said tablet to form an original sound-record, casting a metallic matrix upon said original sound-record and forming duplicate sound-records from said matrix, substantially as described.

2. The process of making sound-records which consists in forming a record-tablet of a chalk composition, supporting a recording stylus in contact with said tablet and moving said stylus and tablet relatively, vibrating said stylus in accordance with sound-waves while in engagement with and moving relatively to said tablet to form an original sound-record, and forming duplicate sound-records from said original, substantially as described.

3. The process of making sound-records

which consists in forming a record-tablet of an impalpable chalk powder and a suitable binder, supporting a recording stylus in contact with said tablet and moving said stylus and tablet relatively, impressing lateral vibrations corresponding to sound-waves on said stylus while in engagement with and moving relatively to said tablet to form an original sound-record, and making duplicate sound-records from said original, substantially as described.

4. The process of making duplicate sound-records which consists in forming a record-tablet, supporting a recording stylus in contact therewith and moving the stylus and tablet relatively, vibrating the stylus in accordance with sound-waves while in contact with and moving relatively to the tablet to form an original sound-record, casting molten metal upon said original record and hardening the metal to form a matrix, and making a duplicate sound-record from said matrix, substantially as described.

5. The process of making duplicate sound-records which consists in forming a record-tablet of an impalpable chalk powder and a suitable binder, supporting a recording stylus in contact with said tablet and mov-

ing the stylus and tablet relatively, impressing lateral vibrations corresponding to sound-waves on said stylus while in engagement with and moving relatively to said tablet to form an original sound-record, casting molten metal upon said original record and hardening the metal to form a matrix, and making a duplicate sound-record from said matrix, substantially as described.

6. The process of making sound-records which consists in cutting a sound-record in a tablet of a material capable of withstanding contact with molten material without injury, casting a matrix thereon, pressing said matrix into a second tablet of a material capable of withstanding a comparatively high degree of heat without injury, casting a second matrix upon said second tablet, and pressing said second matrix into tablets of suitable material, substantially as described.

This specification signed and witnessed this 25th day of February, 1907.

JOHN O. PRESCOTT.
LOUIS J. SCHRAMKE.

Witnesses:

FREDERIC D. WOOD,
BYRON G. HARLAN.

T. KRAEMER.
TALKING MACHINE MECHANISM.
APPLICATION FILED JUNE 3, 1908.

913,828.

Patented Mar. 2, 1909.

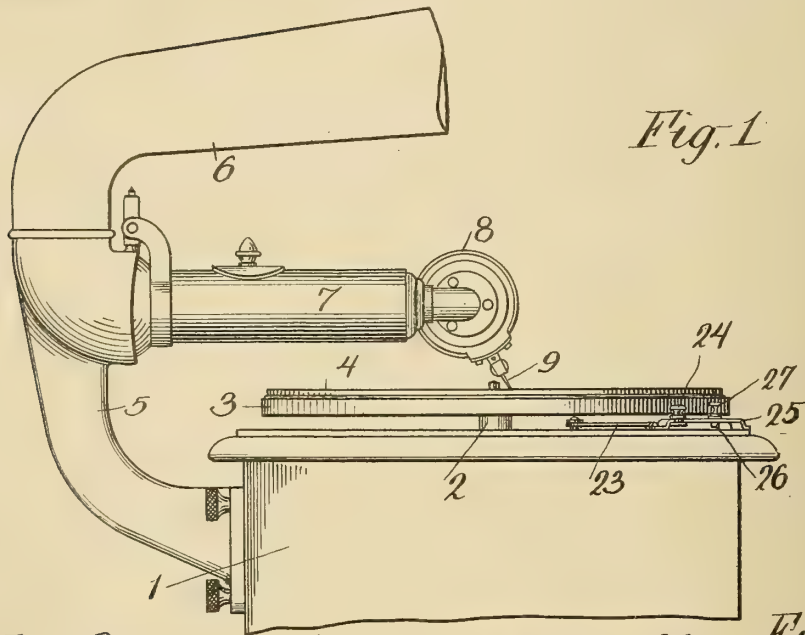
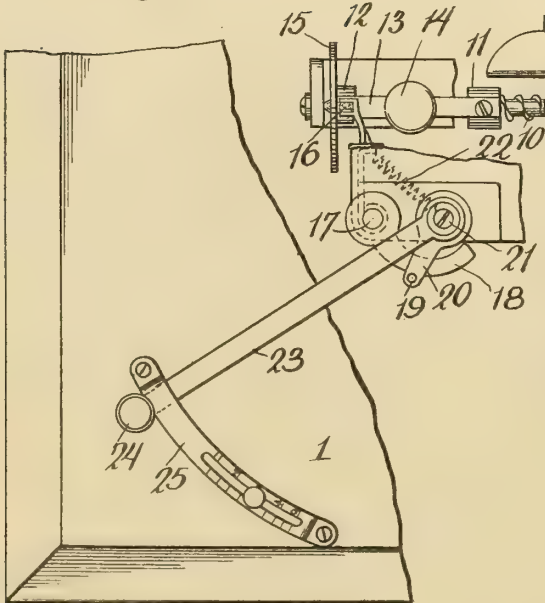


Fig. 1

Fig. 2



WITNESSES:

J. Edwards
S. Bartlett

Fig. 3

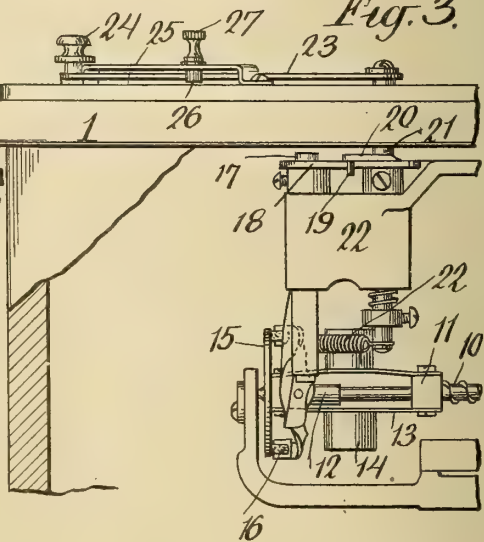
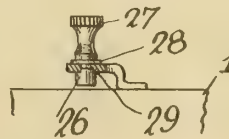


Fig. 4



INVENTOR

Thomas Kraemer

BY

J. Edwards
ATTORNEY

UNITED STATES PATENT OFFICE.

THOMAS KRAEMER, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO HAWTHORNE & SHELBLE MANUFACTURING COMPANY, OF PHILADELPHIA, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

TALKING-MACHINE MECHANISM.

No. 913,828.

Specification of Letters Patent.

Patented March 2, 1909.

Application filed June 3, 1908. Serial No. 436,475.

To all whom it may concern:

Be it known that I, THOMAS KRAEMER, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented a certain new and useful Improvement in Talking-Machine Mechanism, of which the following is a specification.

This invention relates to talking machines and is directed to the provision of improved means for controlling the rotation of the record, whereby such rotation may be started and stopped and its speed regulated as desired.

In the operation of talking machines, it is important that the record be rotated at just the proper speed, since when rotated at any other speed the tone of the reproduction is not so good, and also since rotation at greater than the proper speed causes excessive wear upon the record. I have, therefore, provided means by which the speed of rotation of the record may be predetermined, and with this an adjustable stop device is combined, which may be moved to any desired position with reference to a scale and which arrests the movement of the part which is operated to regulate the speed of rotation of the record.

In accordance with the invention, a starting and speed-regulating lever is provided upon the motor-box of the machine and arranged to move relatively to a scale, by reference to which the lever may be moved to a position which has been found to give the desired speed. An adjustable stop device is arranged in the path of this lever, so that when the speed desired for a reproduction has been found, the stop device may be so positioned that it will arrest the lever in this position and thus permit of moving the lever rapidly to the desired position without referring to the scale.

I have illustrated the preferred embodiment of my invention in the accompanying drawing, in which—

Figure 1 is a view in elevation of a talking machine broken away in part; Fig. 2 is a top view of a portion of the machine, having the motor-box broken away in part to show the governing mechanism; Fig. 3 is a side view of a portion of the machine with the casing similarly broken away; and Fig. 4 is a detail view hereinafter referred to.

Referring to these drawings, 1 indicates

the motor-box of the machine, within which is a spring-motor driving a vertical shaft 2 which carries the turn-table of the machine. The disk record 4 is adapted to rest upon the turn-table 3 and to rotate therewith. Extending outwardly and upwardly from the box 1, is a coupling member 5 having an opening through the upper end thereof, and a horn 6 is supported upon the upper end of the member 5 with the opening therethrough in communication with the opening through the member. A tubular tone-arm 7 is pivotally mounted upon the member 5 so as to swing on both vertical and horizontal pivots, and the opening through this arm is also in communication with the opening through the member 5. The sound-box 8 is secured to the free end of the tone-arm 7, with its stylus 9 tracking in the groove in the record 4.

The spring-motor within the box 1 is of any suitable construction, and therefore I have not considered it necessary to illustrate it. By means of suitable gearing, the spring of the motor is arranged to drive the shaft 2, and a governing mechanism is employed for regulating the speed at which this shaft is driven. This governing mechanism includes a shaft 10 driven by the spring-motor and having two collars 11 and 12 thereon, the former being secured to the shaft and the latter being loose thereon. These two collars are connected by leaf-springs 13, on each of which is secured a governing weight 14. To the loose collar 12, is secured a brake-disk 15, and brakes 16 are adapted to be moved into and out of contact with one face of this disk. The brakes 16 are secured to a pivotally mounted shaft 17 on the upper end of which is a cam-arm 18. A pin 19 acts with the arm 18, this pin being carried by a crank 20 secured upon a shaft 21 which is mounted for rotation in the frame 30 of the motor and which extends upwardly through an opening in the top of the motor-box. The brakes 16 are connected by a spring 22 to a stationary part of the frame, this spring acting upon the brakes in a direction to draw them away from the disk 15, this turning shaft 17 in a direction to hold the arm 18 in engagement with the pin 19.

On the upper end of the shaft 21, is a starting and speed-regulating lever 23, the end of which is provided with a handle 24. A strip 25 is secured at its ends upon the top

of the motor-box and is bent adjacent to its ends to provide a space between it and the top of the motor-box, in which the lever 23 may move. Strip 25 is curved in an arc of

5 a circle about the shaft 21 as a center. On the upper face of the strip are scale markings, as shown in Fig. 2, by reference to which the lever 23 may be moved to the position which will give the desired tone of reproduction. Coacting with the lever 23, is an adjustable
10 stopping device for arresting the movement of the lever. Strip 25 is provided with a longitudinal slot to receive a screw 26, the head of which lies below the strip 25 and the
15 shank of which extends upwardly through the slot and into a threaded opening in a stud 27. A washer 28 of rubber or other suitable material may be provided between the screw and the stud and the head 26 of the
20 screw may have a raised portion 29 thereon entering the slot in the strip 25 to prevent the screw from turning as stud 27 is turned.

As thus constructed, it will be seen that by turning the lever 23 to the right in
25 Fig. 2, shaft 21 is turned and carries with it the crank 20; the shape of the cam 18 is such that when the pin 19 is carried to the right in this way, the cam, shaft 17 and the brakes 16 may turn, actuated by the spring 22, in a
30 direction to carry the brakes 16 away from the disk 15. When this is done, the motor is free to rotate. As the speed of the motor increases, the weights 14 will move outwardly under centrifugal force and thus draw the
35 collar 12 and disk 15 toward the fixed collar 11, and if this movement carries the disk 15 into contact with the brakes 16, the increase in the speed of the motor will be checked. In this way, the speed of rotation of the
40 motor depends upon the position to which the lever 23 is moved, and the strip 25 may be marked off to a scale, by reference to which any desired speed of rotation of the disk may be obtained. After this desired

speed has been found, the stop device may
45 be so positioned that lever 23 may be again moved to this position without the necessity of referring to the scale on the strip 25. Thus by turning the stud 27 to loosen the
50 screw 26, the screw and stud may be moved along upon the strip 25 until the head of the screw is in contact with the lever 23, whereupon the stud 27 may be again tightened. Then after the reproduction has been con-
55 cluded and the lever 23 moved back to the position in which it is shown in Fig. 2 in order to stop the motor, the lever may be moved back to the position in which it was, without referring to scale upon the strip 25, by merely moving it into engagement with the
60 head of the screw 26.

Having now described my invention, what I claim as new therein and desire to secure by Letters Patent is as follows:—

Talking machine mechanism comprising
65 the combination of a rotary support for a sound-record, a motor for rotating the support, a box inclosing the motor, a governing mechanism for the motor, means coact-
70 ing therewith for starting and stopping and regulating the speed of rotation of the motor, a lever pivotally mounted upon the exterior of the box for the motor and arranged to ac-
75 tuate said means, a strip secured at its ends to the motor-box and overlying said lever, said strip having a slot therein and being
80 provided with scale-markings adjacent to the slot, and a stop device for said lever adjustable along said strip and consisting of a screw extending through said slot and a member threaded on the screw, substantially as set forth.

This specification signed and witnessed this 22nd day of May, 1908.

THOMAS KRAEMER

Witnesses:

EMIL SCHNELL.

H. MUILSCHLEGEL.

A. T. E. WANGEMANN.
 PHONOGRAPH HORN.
 APPLICATION FILED AUG. 3, 1905.

913,930.

Patented Mar. 2, 1909.

2 SHEETS—SHEET 1.

Fig. 1.

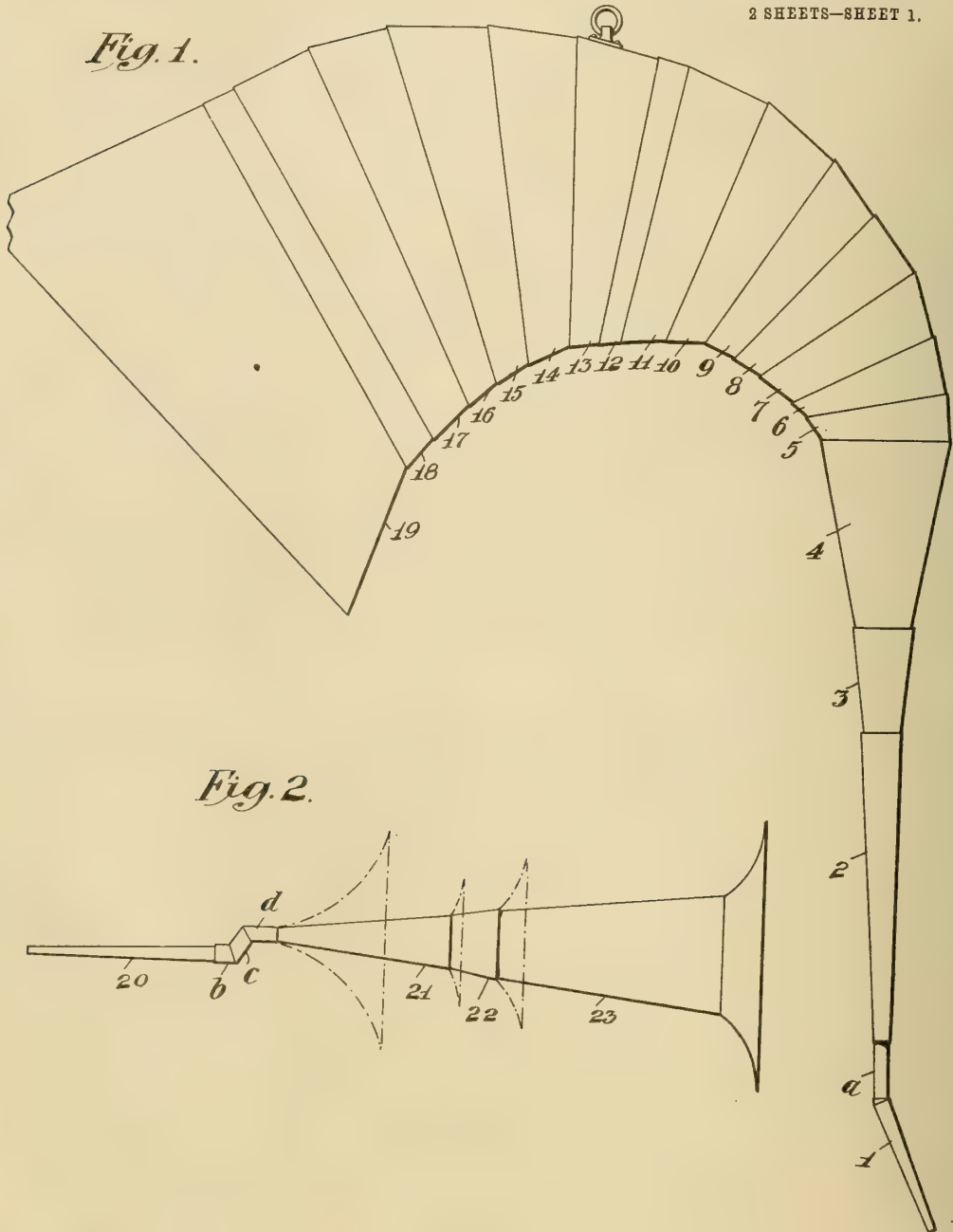
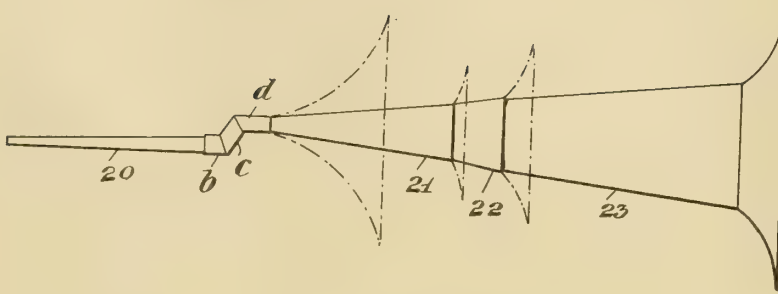


Fig. 2.



Attest:

Edgeworth Greene
Delos Holden

Inventor:

Adelbert Theo Edward Wangemann
 by *Frank L. Rye* his Att'y.

913,930.

A. T. E. WANGEMANN.
PHONOGRAPH HORN.
APPLICATION FILED AUG. 3, 1905.

Patented Mar. 2, 1909.
2 SHEETS—SHEET 2.

Fig. 3.

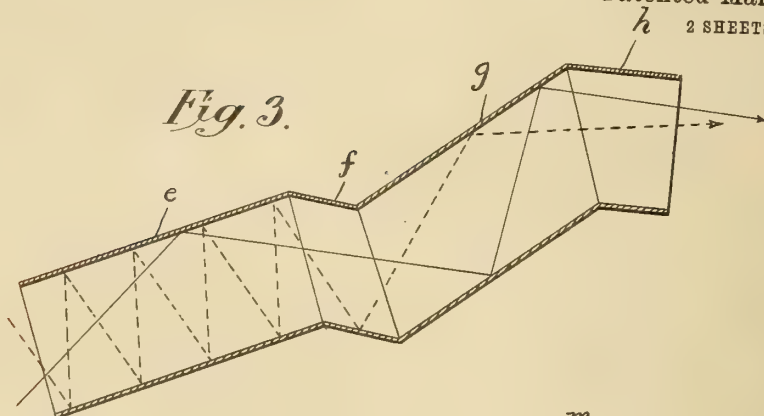


Fig. 4.

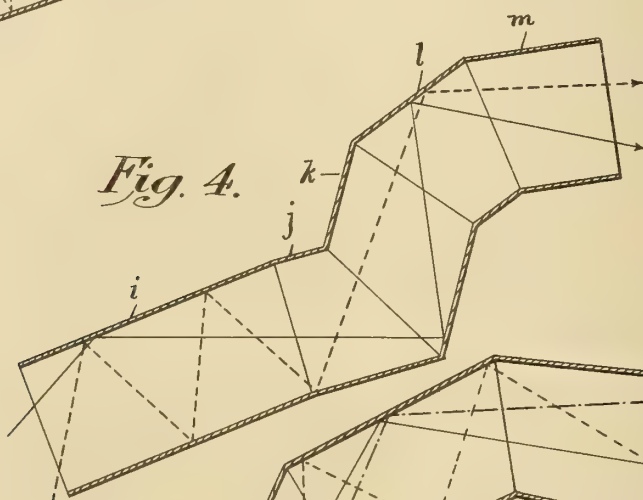
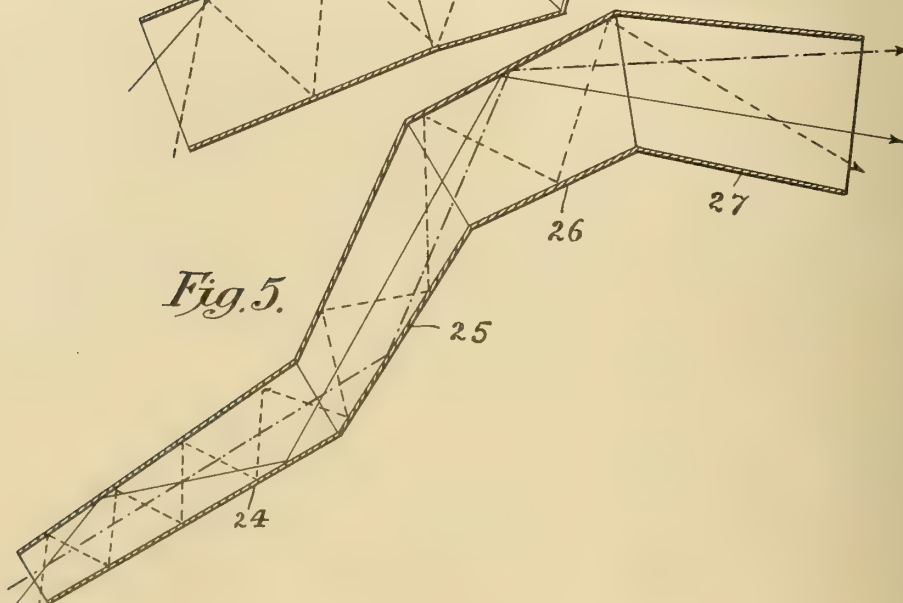


Fig. 5.



Attest:

N. J. McJannet
De los Golden

Inventor:

Adelbert Philo Edward Wangemann
by *Frank L. Hays* his Atty.

UNITED STATES PATENT OFFICE.

ADELBERT THEO. EDWARD WANGEMANN, OF WEST ORANGE, NEW JERSEY, ASSIGNOR TO
NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF
NEW JERSEY.

PHONOGRAPH-HORN.

No. 913,930.

Specification of Letters Patent.

Patented March 2, 1903.

Application filed August 3, 1905. Serial No. 272,472.

To all whom it may concern:

Be it known that I, ADELBERT THEO. E. WANGEMANN, a citizen of the United States, residing at West Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Phonograph-Horns, of which the following is a description.

In the reproduction of sounds by means of the Edison phonograph and other talking machines, it is well known that in order to obtain sounds having much volume and a sufficient proportion of overtones to produce a pleasing quality, it is necessary to use an amplifying horn or trumpet. It has been found, however, that it is not possible to obtain from any horn sounds having absolutely correct proportions of tones and overtones, the best horns producing merely an approximation to the desired result.

The present invention has for its object the production of a horn for use with phonographs and similar instruments which will produce a more perfect combination of tones and overtones than horns previously made, so that when used for recording purposes, the elevations and depressions constituting the sound record will correspond more accurately to the actual tones and overtones given out by the instruments or voice producing the sounds, and when used for reproducing will produce such tones and overtones in more accurate proportions than horns previously known. It is well known that in order to produce pleasing sounds practically all the sound waves produced at a given time should reach the ear at the same instant. If, for example, a person is listening to a speaker or singer in a large hall, the waves will, of course, travel directly to the listener, but there will also be a reflection of sound waves from the walls of the room which reach the listener somewhat later and a few of these reflections will reach the listener in ample time to augment the directly received sound wave—others will travel and be reflected so often and be in consequence so weakened that their influence on the spoken word or the tones of music are nullified. The reflected waves plus the direct wave give to every such room or space its own tone of resonance of peculiar character. Now in the case of phonographic reproduction, my belief is that the reproducer diaphragm sets up in the sound box waves traveling in almost every direction, so

that two principal classes of waves issue therefrom into the resonating horn, namely those which travel in a direction parallel or slightly inclined to the axis of the horn, and which may be called direct waves and those whose direction of travel is considerably inclined to said axis, and which I prefer to term "cross vibrations." It is obvious that since the path of travel of the cross vibration is longer than that of the direct vibrations, they will reach the listener later than the direct and thereby produce an unpleasant effect of rumbling sound; they will cover up and destroy and counteract a number of the direct waves.

My invention has for its further object the elimination of all or a large part of said cross vibrations, or the conversion thereof into direct waves.

With these ends in view, my invention consists in the features hereinafter set forth and claimed.

Reference is hereby made to the accompanying drawing in which—

Figure 1 illustrates one form of horn constructed in accordance with my invention. Fig. 2 illustrates a modification. Figs. 3, 4 and 5 are sectional detail views.

The horns illustrated are the result of many years of experimentation. I have constructed and tested vast numbers of horns as applied to phonographs, and I find that the quality of tones produced is most nearly perfect in a horn whose axis is not a straight line, that is, one whose axis is a broken line. In a horn such as this, reflection of the sound waves takes place, caused by the walls of the horn. Such reflection tends to eliminate cross vibrations, or to convert them into direct waves as clearly shown in Figs. 3, 4 and 5, wherein the full lines represent approximately the paths of direct waves, and the dotted lines the paths of cross vibrations, and it is observed that the waves entering each section as cross vibrations are in each case converted into direct waves. The sections *c*, *f*, *g* and *h* of Fig. 3 are cylinders, as are also the sections *i*, *j*, *k*, *l* and *m* of Fig. 4. In Fig. 5 the sections 24, 25, 26 and 27 are cones. These figures do not represent complete horns. Figs. 3 and 4 may be used to replace section *a* of the horn of Fig. 1 or sections *b*, *c* and *d* of Fig. 2. Fig. 5 may replace *l* and *a* of Fig. 1, or 20, *b*, *c* and *d* of Fig. 2. It may also be

that the reflection caused by the walls of the horns shown, causes more or less separation of the tones and overtones, so that each class of sound vibrations may affect its own portion of the wall of the horn, throwing it into vibration and producing resonance without interference from other tones.

I have also found that the quality of tones produced by a horn composed of sections, the elements of whose inner surface are straight lines (*i. e.*—cones or cylinders) rigidly secured together and so arranged that angles occur at the joints of adjacent sections, is superior to those produced by a horn of curved form wherein no such angles exist. The reason for this may possibly be that the joints act as transverse stiffening rings which increase the rigidity of the horn, or because this construction permits the sections to vibrate independently and without interference from adjacent sections, or because it is better for eliminating cross vibrations. In the horn illustrated in Fig. 1 it will be observed that there are 18 distinct angles in the walls of the horn.

I have also discovered that the quality of tones may be improved by the insertion of sections which do not taper, that is, cylinders. Thus in Fig. 1, the horn is built up of the conical sections 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18 and 19. Between the sections 1 and 2 is a cylindrical section *a*. The horn from which the drawing was made is very large. The circumference of the large end thereof is 11 feet, 10½ inches, but I do not consider my invention limited to horns of any particular size.

In Fig. 2 the sections 20, 21, 22 and 23 are conical and the sections *b*, *c* and *d* are cylindrical. In this figure I have illustrated by dotted lines various forms of horn all of which utilize the principles of my invention.

I have discovered, furthermore, that it is desirable to increase the degree of taper of the walls of the successive sections as they increase in diameter. That is to say, the amount of inclination of the walls of the horn with respect to its axis should increase from the small end of the horn to the large, thereby producing a flaring shape. In case the taper does not increase the tones are apt to be somewhat muffled. The cylindrical sections are preferably located near the small end of the horn but may be located at any portion of its length.

In constructing the horns, the small end of each conical section is fitted into the end of its adjacent section (whether conical or cylindrical), and considerable pressure applied, in which condition the sections are soldered together, so that the walls of the

finished horn are extremely rigid, yet capable of local vibration. The material used is preferably sheet metal, although other materials may be used, however, if desired.

Having now described my invention, what I claim as new and desire to secure by Letters Patent is as follows:

1. As a new article of manufacture, a horn for phonographs and other talking machines, comprising a series of conical sections rigidly secured together, the sections being of progressively increasing diameter and taper, substantially as set forth.

2. As a new article of manufacture, a horn for phonographs and other talking machines comprising a series of conical sections rigidly secured together, the sections being of progressively increasing diameter and taper and being so arranged that their axes form a broken line, substantially as set forth.

3. As a new article of manufacture, a horn for phonographs and other talking machines, comprising a series of tubular tapering sections of progressively increasing diameter and taper, and a tubular non-tapering section interposed between two of said tapering sections, substantially as set forth.

4. As a new article of manufacture, a horn for phonographs and other talking machines, comprising a series of tubular tapering sections of progressively increasing diameter and taper, and a plurality of tubular non-tapering sections interposed in said series of tapering sections, substantially as set forth.

5. As a new article of manufacture, a horn for phonographs and other talking machines, comprising a number of tubular tapering sections of progressively increasing taper and diameter from the small end toward the large end of the horn, and a plurality of tubular non-tapering sections interposed between tapering sections, the axes of all said sections being arranged at angles to each other, substantially as set forth.

6. As a new article of manufacture, a horn for phonographs and other talking machines, comprising a series of conical and cylindrical sections rigidly secured together, the conical sections being of progressively increasing diameter and taper, substantially as set forth.

This specification signed and witnessed this 1st day of August, 1905.

ADELBERT THEO. EDWARD WANGEMANN.

Witnesses:

DELOS HOLDEN.

FRANK L. DYER.

L. P. VALIQUET.
TALKING MACHINE.
APPLICATION FILED FEB. 2, 1907.

914,765.

Patented Mar. 9, 1909.
2 SHEETS—SHEET 1.

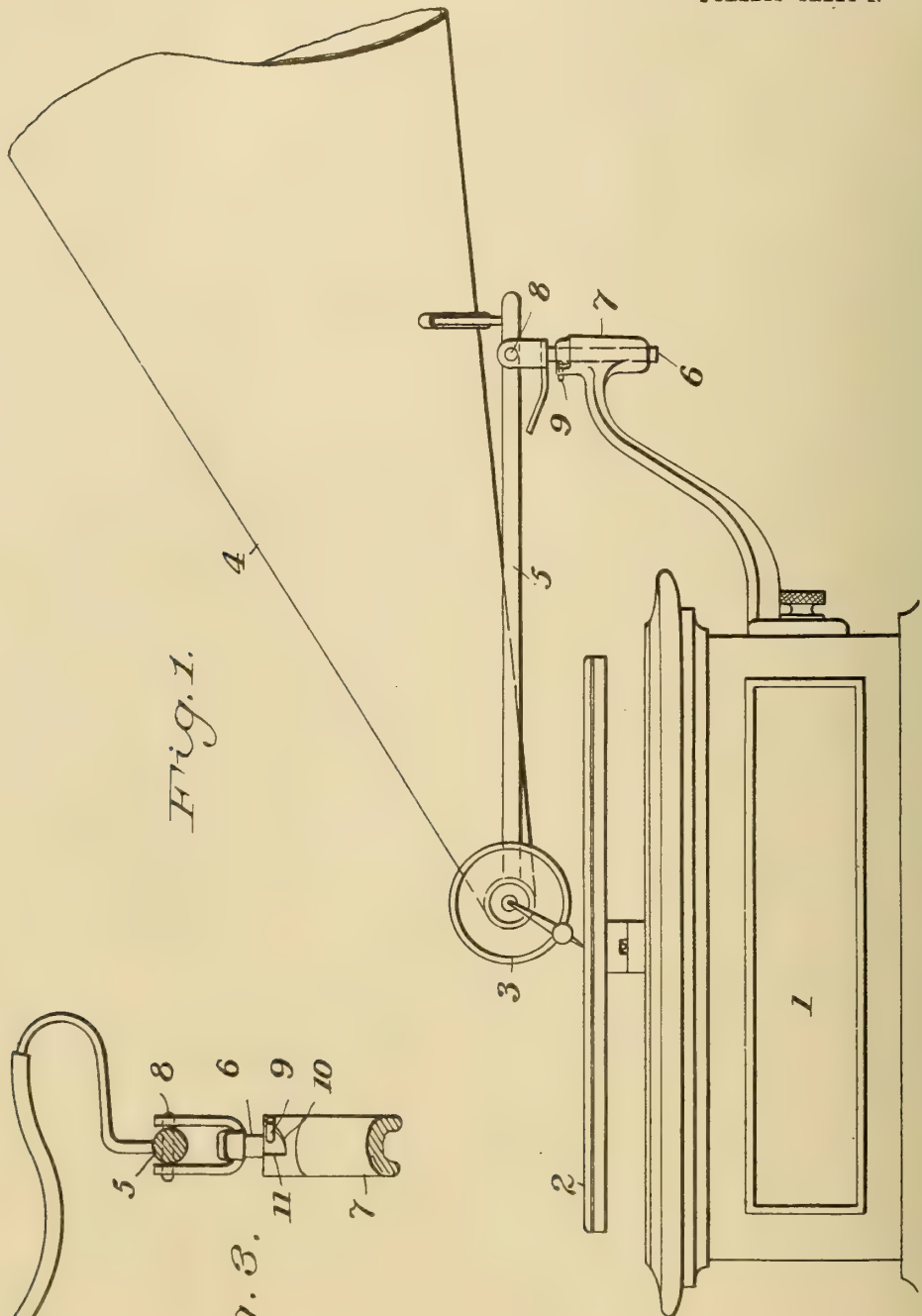


Fig. 1.

Fig. 3.

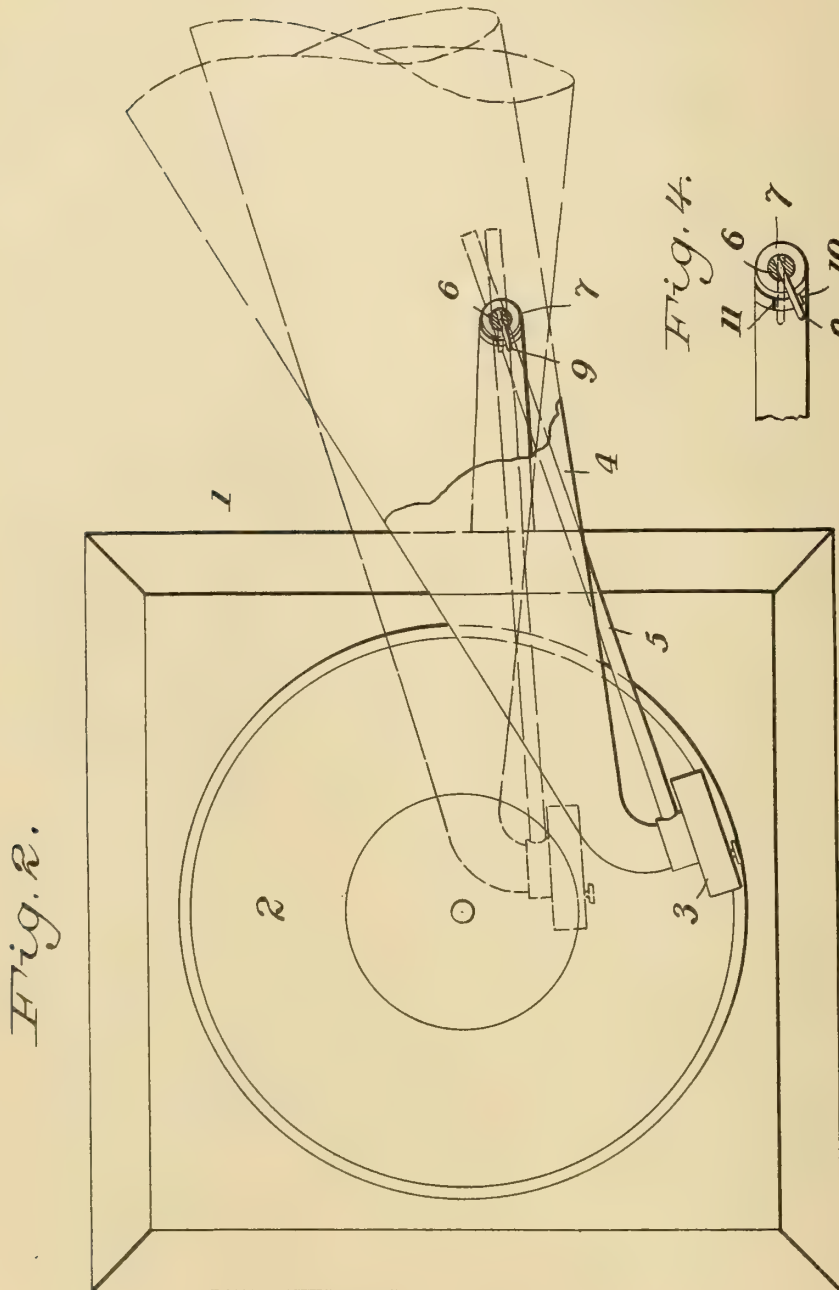
Witnesses
D. L. Magnien
W. J. Crawford

Inventor
Louis P. Valiquet
By his Attorney
W. H. Berkhart

L. P. VALIQUET.
TALKING MACHINE.
APPLICATION FILED FEB. 2, 1907.

914,765.

Patented Mar. 9, 1909.
2 SHEETS—SHEET 2.



Witnesses
O. L. Macgibrey
M. S. Crawford

Inventor
Louis P. Valiquet
By his Attorney J. Parker Smith

UNITED STATES PATENT OFFICE.

LOUIS P. VALIQUET, OF NEWARK, NEW JERSEY, ASSIGNOR, BY MESNE ASSIGNMENTS, TO
HAWTHORNE & SHEBLE MANUFACTURING COMPANY, OF PHILADELPHIA, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

TALKING-MACHINE.

No. 914,765.

Specification of Letters Patent.

Patented March 9, 1909.

Application filed February 2, 1907. Serial No. 355,474.

To all whom it may concern:

Be it known that I, LOUIS P. VALIQUET, a citizen of the United States of America, and a resident of Newark, county of Essex, and State of New Jersey, have invented certain new and useful Improvements in Talking-Machines, of which the following is a specification.

My invention comprises a simple means for positively feeding the reproducer across the sound record in that type of machine known as the disk record talking machine.

The best form of apparatus embodying my invention at present known to me is shown in the accompanying two sheets of drawings in which,

Figure 1 is a side elevation of a talking machine with my invention applied thereto; Fig. 2 is a plan view of the same with parts broken away or shown in section; Fig. 3 is a detail view of the pivot pin and feed cam, the cam being shown in elevation, and Fig. 4 is a detail plan view of the cam, the pivot pin being shown in cross section.

Throughout the drawings like reference figures indicate like parts.

1 is the case containing the usual motor (not shown) for rotating the disk sound record 2. The sound box 3 and horn 4 constitute the usual reproducing mechanism mounted on the swinging arm 5. The arm 5 is supported at its outer end by a universal joint, one element of which is formed by the pivot pin 6 mounted in a vertical sleeve or journal bearing 7 which is rigidly supported from the case of the machine. This pin is hinged to the arm 5 at 8, thus forming the other element of the universal joint. The foregoing parts are all of present standard construction.

The pin 6, is according to my invention, provided with a projection 9 which engages the cam 10 formed in, or attached to, the sleeve or socket 7. This cam terminates preferably in a vertical portion or stop 11.

The operation of my invention is as follows: When the projection 9 is lifted out of engagement with the cam 10 and the reproducer is swung to one side, out of engagement with the record, no feeding action occurs. When, however, the reproducer is placed over or upon the record, the projection 9 rests on the inclined surface of the cam 10, and as the weight of the horn tends

to force the pivot pin 6 downward, the cam tends to twist the pin 6, and swing the arm 5 and positively feeds the reproducer across the sound record in a direction to reproduce the sounds recorded therein. When the reproducer has traveled across the record the projection 9 strikes stop 11 and farther travel is prevented. The pivot pin is then lifted out of the cam opening and the reproducer swung to one side so that the projection will ride on one of the horizontal surfaces to one side or the other of the cam opening, or the arm 5 may be simply swung back, which will cause the projection 9 to travel up over the cam and out of the cam opening to the left (looking at Fig. 3).

The advantages of my invention comprise its simplicity of construction and positiveness of action. It does not complicate or add to the present standard construction, nor require the user to be taught anything new. At the same time it is a positive feeding means which will force the reproducer across the record even if the machine is not set level, and by holding the reproducing needle always against one side of the sound record groove prevents the same from chattering.

It is evident that the particular location of the cam might be varied so long as it coöperates with the reproducer in the manner described.

Having described my invention what I claim is,

1. In a talking machine, the combination of a holder for a disk sound-record and means for rotating the same and the record thereon, a support, reproducing mechanism including a stylus pivotally mounted on said support and a cam mechanism for applying yielding-pressure to said reproducing mechanism to turn it about its pivotal support so that the stylus of the reproducing mechanism may track in and be restrained by the record-groove throughout the several convolutions thereof, substantially as set forth.

2. In a talking machine, the combination of a holder for a disk sound record and means for rotating the same and the record thereon, a support, reproducing mechanism including a stylus pivotally mounted on said support and a cam mechanism for applying yielding pressure to said reproducer

ing mechanism to turn it about its pivotal support so that the stylus of the reproducing mechanism may track in and be restrained by the record-groove throughout the several convolutions thereof, said cam mechanism being so constructed that restoring said reproducing mechanism to its initial position restores the cam mechanism to potential position, substantially as set forth.

3. In a talking machine, the combination of a holder for a disk sound-record and means for rotating the same and the record thereon, a support, reproducing mechanism including a stylus carried thereby, and a cam mechanism for yieldingly propelling said reproducing mechanism in a plane substantially parallel with the surface of the sound-record so that the stylus thereof may track in the record-groove and the action of said cam-mechanism be restrained by the record-groove throughout the several convolutions thereof, substantially as set forth.

4. In a talking machine, the combination of a holder for a disk sound-record and means for rotating the same and the record thereon, a support, reproducing mechanism including a stylus carried thereby, a cam mechanism for yieldingly propelling said reproducing mechanism across the sound-record so that the stylus thereof may track in the record-groove and the action of said cam mechanism be restrained by the record-groove throughout the several convolutions thereof, said cam mechanism being so constructed that restoring said reproducing mechanism to its initial position restores the cam mechanism to potential position, substantially as set forth.

5. In a talking machine, the combination of a holder for a disk sound-record and means for rotating the same and the record thereon, a support, reproducing mechanism including a stylus mounted upon said support and vertically movable thereon, and means dependent upon the vertical movement of said reproducing mechanism upon said support under the influence of gravity for yieldingly propelling said reproducing mechanism in a plane substantially parallel with the surface of the sound-record so that the stylus thereof may track in and be restrained by the record-groove throughout the several convolutions thereof, substantially as set forth.

6. In a talking machine, the combination of a holder for a disk sound-record and means for rotating the same and the record thereon, a support, reproducing mechanism including a stylus mounted upon said support and vertically movable thereon, and means dependent upon the vertical movement of said reproducing mechanism upon said support under the influence of gravity for yieldingly propelling said reproducing mechanism in a plane substantially paral-

lel with the surface of the sound-record so that the stylus thereof may track in and be restrained by the record-groove throughout the several convolutions thereof, said yieldingly propelling means being so constructed that restoring said reproducing mechanism to initial position causes it to move upward vertically upon said support, substantially as set forth.

7. In a talking machine, the combination of a holder for a disk sound-record and means for rotating the same and the record thereon, a support, movable reproducing mechanism including a stylus carried thereby and coacting parts one on said support and the other moving with said mechanism and one of which is provided with an inclined surface, the coaction of said parts during the reproduction of a sound-record causing said reproducing mechanism to be yieldingly propelled in a plane substantially parallel with the surface of the sound-record so that the stylus thereof may track in and be restrained by the record-groove throughout the several convolutions thereof, substantially as set forth.

8. In a talking machine, the combination of a holder for a disk sound-record and means for rotating the same and the record thereon, a support, reproducing mechanism including a sound-box and its stylus and a sound-conveying tube with which the sound-box is connected, a bracket pivotally connected to said support and said tube and adapted to turn relatively to the support on a vertical axis and relatively to the tube on a horizontal axis, and coacting parts, one on said bracket and the other on said support, and one of which is provided with an inclined surface, said coacting parts forming a cam mechanism for yieldingly propelling said reproducing mechanism in a plane substantially parallel with the surface of the sound-record so that the stylus thereof may track in and be restrained by the record-groove throughout the several convolutions thereof, substantially as set forth.

9. In a talking machine, the combination of a holder for a disk sound-record and means for rotating the same and the record thereon, a support, reproducing mechanism including a stylus carried thereby, means independent of the sound-record and its rotating means for exerting yielding pressure on said reproducing mechanism to move the same across said sound-record so that the stylus thereof may track in and be restrained by the record-groove, and a stationarily mounted device located in position for discontinuing the movement of the reproducing mechanism across the record after the stylus thereof has reached the end of the record-groove, substantially as set forth.

10. In a talking machine, the combination of a holder for a disk sound-record and

means for rotating the same and the record thereon, a support, reproducing mechanism including a stylus carried thereby, means independent of the sound-record and its rotating means for exerting yielding-pressure on said reproducing mechanism to move the same across said sound-record so that the stylus thereof may track in and be restrained by the record-grooves, and a stationarily mounted device located in position for discontinuing the movement of the reproducing mechanism across the record after the stylus thereof has reached the end of the record-groove, said yielding-pressure means being so arranged that it is restored to potential relation by restoring said mechanism to its initial position, substantially as set forth.

11. In a talking machine, the combination of a holder for a disk sound-record and means for rotating the same and the record thereon, a support, reproducing mechanism including a stylus carried thereby, a cam mechanism independent of the sound-record and its rotating means for exerting a yielding-pressure on said reproducing mechanism to move the same across said sound-record so that the stylus may track in and be restrained by the record-groove, and means for arresting movement of said reproducing mechanism across the record after the stylus thereof has reached the end of the record-groove, substantially as set forth.

12. In a talking machine, the combination of a holder for a disk sound-record and

means for rotating the same and the record thereon, a support, reproducing mechanism including a stylus carried thereby, a part having an inclined wall thereon and a wall at the end of said inclined wall forming a stop and a part movable relatively to said part and adapted to ride on said inclined wall and against said stop, said parts being arranged to exert a yielding-pressure on said reproducing mechanism to move the same across said sound-record and to arrest such movement after the stylus of the reproducer has reached the end of the record-groove, substantially as set forth.

13. In a talking machine, the combination of a support for a sound-record and means for rotating the same and the sound-record thereon, reproducing mechanism including a stylus, a sound-conveying tube carrying the same, a pin forming a pivotal support for said tube, a part having a surface substantially perpendicular to the axis of said pin and a notch having an inclined wall cut in said surface and a part adapted to ride on said inclined wall and to coact therewith to exert a yielding-pressure on said tube to move the same about its pivot, substantially as set forth.

Signed at New York, N. Y., this 28 day of January, 1907.

LOUIS P. VALIQUET.

Witnesses:

E. L. MACRUBREY,
M. G. CRAWFORD.

L. T. HAILE.

GRAMOPHONE.

APPLICATION FILED JULY 8, 1907.

914,826.

Patented Mar. 9, 1909.

Fig. 1.

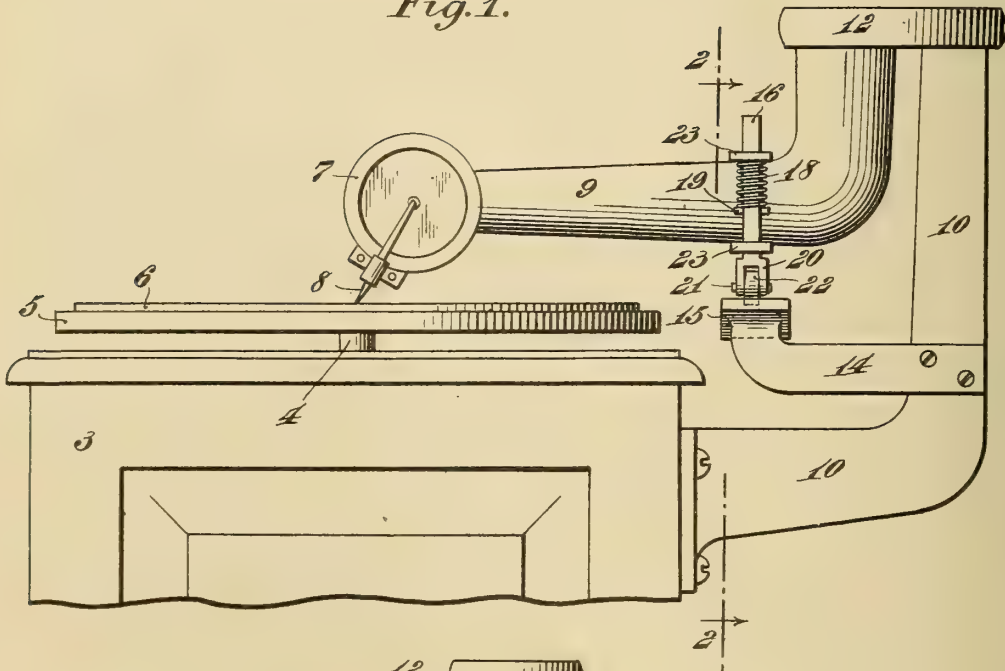
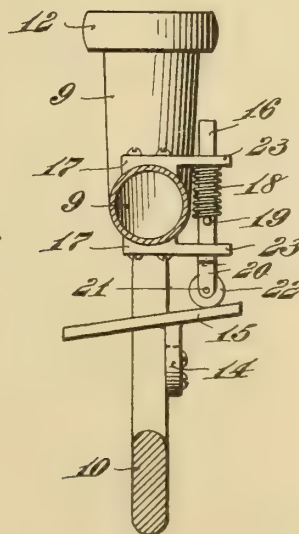


Fig. 2.



WITNESSES:

Jas C. Wolensmith
Q. M. Fiddle

INVENTOR

Luther T. Haile

BY

H. V. Keaton

ATTORNEY.

UNITED STATES PATENT OFFICE.

LUTHER T. HAILE, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR, BY MESNE ASSIGNMENTS, TO HAWTHORNE & SHEBLE MANUFACTURING COMPANY, OF PHILADELPHIA, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

GRAMOPHONE.

No. 914,826.

Specification of Letters Patent.

Patented March 9, 1909.

Application filed July 8, 1907. Serial No. 382,575.

To all whom it may concern:

Be it known that I, LUTHER T. HAILE, a citizen of the United States, residing in the city of Philadelphia, State of Pennsylvania, have invented certain new and useful Improvements in Gramophones, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention has for its object to provide means for operatively supporting and propelling the sound-box mechanism and its adjunctive stylus or needle over the rotating sound-record or tablet, in order that the latter shall be relieved of the necessity, as in the known type of such machines, for the performance of that function. Advantages flowing from my invention, in the performance of that function by means distinct from the record-tablet itself are manifold, chief of which are that considerable of the weight of the sound-box mechanism is no longer borne by the record-tablet, resulting in its sound-grooves being less worn by any given amount of use of the machine, and also tending largely to compensate for inequalities in the record; and the needle has less, if any, scratching against the non-vibration producing bottom of the sound-grooves; and last, but of equal if not greater importance, the needle is kept in closer contact with the side walls of the sound grooves, resulting in imparting to it stronger vibratory movements and consequently effecting like vibrations of the sound-box diaphragm and consequent louder and clearer tones therefrom.

In the accompanying drawings wherein Figure 1 is a side elevation, and Fig. 2 a section on line 2-2 of Fig. 1, is shown my invented mechanism as applied to a known type of gramophone, only so much of the latter being shown as is necessary to understand and apply my invention thereto.

Referring now to said drawings: 3 indicates a gramophone cabinet containing, as usual, the main actuating shaft 4 for the rotating turn-table 5 which operatively supports the record-tablet 6; and 7 indicates a known type of sound-box mechanism with its stylus or needle 8, while 10 indicates a bracket arm fixedly mounted on the side of the cabinet 3, and supporting the sound-conveying tube 9 which directly, in some types, and indirectly

in other types, carries on its smaller and inlet end the diaphragm-holder or sound-box 7 and its adjunctive parts. The bracket arm 10 has a yoke or other analogous bearing 12 to enable the sound-conveying tube 9 to freely swing laterally in a short arc of a circle, as usual, to enable the sound-box mechanism to traverse the record radially, from rim to center thereof, and operatively contact with the spiral sound-grooves therein, while such record is being rotated by the main actuating shaft as usual, in the operating of the gramophone. My device may be applied to any form of that type of talking machine having a horizontally-disposed rotatable record-tablet.

My added device, I will now describe by reference to the drawing. A supporting bracket 11 is shown mounted on the lower part of the usual bracket 10, though, if preferred, it may be mounted independently thereof and on the side wall of the cabinet 3. On the free end of the bracket 11 is fixedly supported a small flat plate 15, an essential of which is that it shall be supported on an incline relatively to the horizontal plane of the turn-table and record-tablet, the incline downward being toward the center of the turn-table, in the direction of the lateral swing of the sound-box mechanism and the sound-conveying arm which carries it, so as to constitute an inclined plane relatively thereto. Although I have shown the plate 15 fixedly supported on the free end of the bracket 11, it is obvious that it may be mounted thereon so as to be adjustable vertically, such as by a pin playing in a slot in the end of the bracket 11, and controlled by a set screw or other analogous means so that not only the vertical height but the angle of inclination of the plate 15, relatively to the tablet, may be regulated if desired. The element, co-acting with the inclined plate 15 in my device, to accomplish the object sought, is a vertically-sliding rod 16, mounted in a spindle bracket 17 dependently supported from the sound-conveying tube; the bracket carrying a pair of parallel co-plates 18, through holes in both of which the rod 16 is free to move vertically, and between which plates a coiled spring 18, on either the rod, is applied to bear against a pin 19 to exert a constant tendency to depress the rod vertically. The lower end of the rod 16 is divided

at 20 with a pin 21 between the divided ends, to afford a bearing for a small friction wheel 22, preferably rubber-tired, and which is thus kept in constant contact with the upper
5 face of the inclined plate 15.

The operation of the device is as follows:—
Rotating movement in a horizontal plane being given to the sound-grooved record-tablet, and the point of the stylus or needle
10 brought into operative contact relation thereto, the friction wheel of the spring-controlled rod will then be resting on the face of the inclined plate 15 at or near the highest point thereof. The needle, in the operation
15 of the machine, should move radially over the record in a direction from rim to center thereof; the sound-conveying arm which supports and directs it in such movement, will perform that function by a short arc-like
20 swinging movement in a horizontal plane, in a certain and positive manner by the action of the spring-actuated friction wheel co-acting with the inclined plane; so that during the rotation of the tablet the movement of
25 stylus over the tablet is rendered certain and positive, without any aid from the record itself, as before relied on, and moreover the needle is kept in close operative contact with the walls of the sound-grooves on the tablet.
30 The distinctive principle embodied in the device is the provision of means such as by a spring-controlled sliding rod, causing a friction wheel to bear against an inclined plane, the wheel being carried by the tubular sound-
35 conveying arm (carrying the sound-box and stylus) causing it to bear in a vertical direction against the face of the record and also to impart a swinging lateral movement to such sound-conveying arm and its adjunctive
40 sound-box and stylus. Hence I do not wish to confine myself to the specific mechanism described embodying this principle of construction and operation, but to include any obviously equivalent substitution therefor
45 operating on the same principle to effect the same result.

Having thus described my invention, I

claim as new and desire to secure by Letters Patent:—

1. In a talking machine, the combination 50 of a holder for a disk sound-record and devices for rotating the same and the record thereon, a support, reproducing mechanism including a stylus pivotally mounted thereon, and means independent of the sound-rec- 55 ord and its driving device for yieldingly propelling said mechanism in a plane substantially parallel with the surface of the sound-record so that the stylus thereof may track in and be restrained by the record-groove 60 throughout the several convolutions thereof, said means consisting of two parts one moving with said mechanism and the other stationary with respect thereto, one of said parts having an inclined surface and the 65 other of said parts having a roller coacting with said inclined surface, substantially as set forth.

2. In a talking machine, the combination 70 of a holder for a disk sound-record and devices for rotating the same and the record thereon, a support, reproducing mechanism including a stylus pivotally mounted therein, and means independent of the sound-rec- 75 ord and its driving device for yieldingly propelling said mechanism in a plane substantially parallel with the surface of the sound-record so that the stylus thereof may track in and be restrained by the record-groove 80 throughout the several convolutions thereof, said means consisting of two parts one having a surface inclined relatively to the surface of the sound-record and the other provided with a spring for forcing it into en- 85 gagement with said inclined surface, substantially as set forth.

In testimony whereof, I have hereunto affixed my signature this 27th day of June A. D. 1907.

LUTHER T. HAILE.

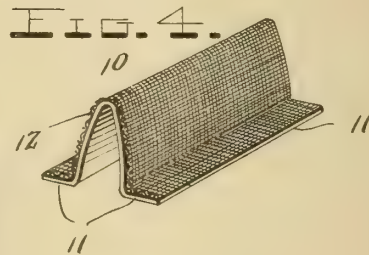
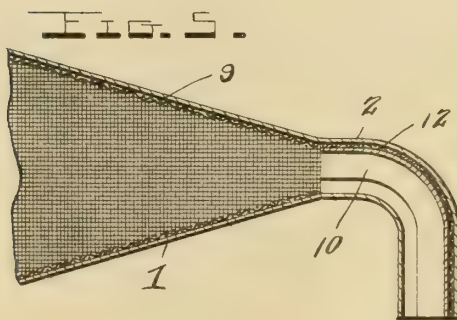
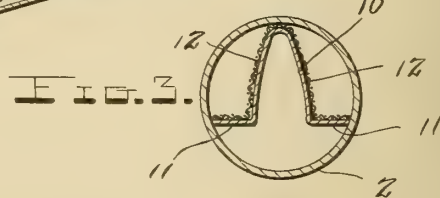
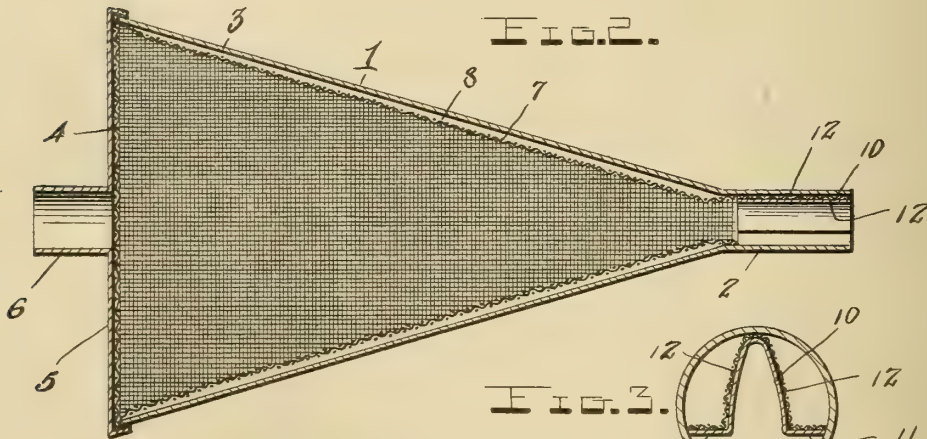
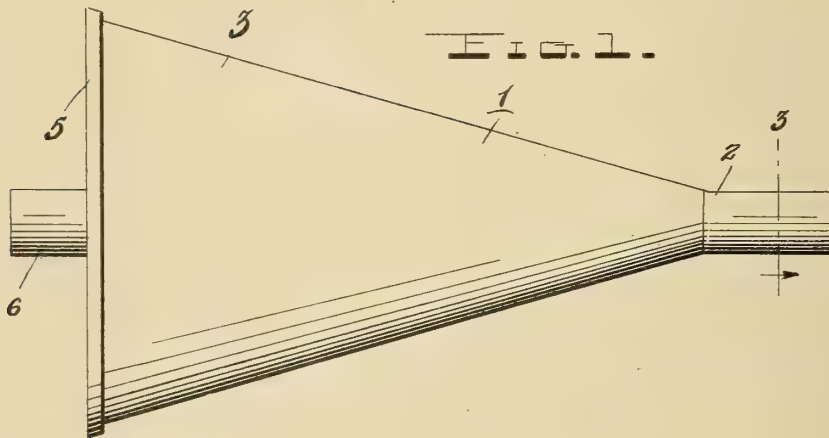
Witnesses:

A. M. BIDDLE,
JAS. C. WOBENSMITH.

G. W. DUNCAN.
 PHONOGRAPH HORN.
 APPLICATION FILED MAY 28, 1908.

914,934.

Patented Mar. 9, 1909.



Witnesses

Chas. L. Griesbauer
 C. H. Griesbauer

By

George W. Duncan
 H. B. Wilson & Co.

Attorneys

UNITED STATES PATENT OFFICE.

GEORGE W. DUNCAN, OF CHICAGO, ILLINOIS.

PHONOGRAPH-HORN.

No. 914,934.

Specification of Letters Patent.

Patented March 9, 1909.

Application filed May 28, 1908. Serial No. 435,484.

To all whom it may concern:

Be it known that I, GEORGE W. DUNCAN, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Phonograph-Horns; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to acoustics, and is particularly directed to the improvement in the acoustic products of phonograph or graphophone horns, speaking tubes or megaphones.

The object of the invention is to provide a device of this character which will be efficient in operation and cheap to manufacture; which will have its tone properly modulated to eliminate all harsh, squeaky and unpleasant noises so that the pure mellow notes of the voice or instrument are reproduced approximately in the form and tone of their original production.

Heretofore to the best of my knowledge there has been no horn produced which does not at some time give forth blares which usually spoil the whole rendition.

It is the object of my invention to obviate this difficulty and others inherent in the present type of graphophone horns, and broadly speaking consists in applying to the horn a dampening device and an accentuator or tone reproducer in the form of a rib or partition placed in the horn in the form of the human vocal cords.

With these and other objects in view, the invention consists of certain novel features of construction, combination and arrangement of parts, as will be more fully described and particularly pointed out in the appended claims.

In the accompanying drawings, Figure 1 is a side elevation, Fig. 2 is a longitudinal section therethrough, Fig. 3 is a transverse section on the line 3-3 of Fig. 1, Fig. 4 is a detail perspective view of the vocal piece removed from the horn, and Fig. 5 is a fragmentary section showing the modification.

Referring more especially to the drawings, 1 represents the horn which as is usual has a reduced end 2, and a flared end 3. In the proposed improvement I provide a covering 4 for the flared end 3, which is preferably made of some textile fabric and is held in

place by gluing to the outside of the horn, or by a suitable clamping frame 5, as is shown, which supports an exhaust tube 6 for the sound to which may be connected the ear tubes for use in connection with slot machines. As shown in Fig. 2 the inner side of the horn is lined with a fabric 7, which is held to the tube by being cemented at the flared end and at the reduced end 3 and 2 respectively, thus allowing the intermediate space or channel 8, which acts as a deadener for overtone vibration in the horn.

In Fig. 5 the fabric 9 is secured to the horn by being cemented throughout its length so as to leave no space between the fabric and the horn, and it will be understood that either method may be adopted and that the fabric may be cemented to the horn throughout a portion of its length and left loose for the remainder of its length, it being of course secured at the inner and outer ends. The extension from the horn to the reproducer or sound box may also be treated in a like manner.

In order to accentuate and render clear the sound caused by the diaphragm of the reproducer I insert into the small end of the horn, or the connecting tube from the reproducer to the horn as is shown in the several different figures a device which comprises a substantially U-shaped member 10, having its extremities flared out at right angles into lateral flanges 11, which engage the interior of the horn or extension and act in connection with the apex of the member to support the device in the horn or extension. The sound waves from the diaphragm act upon the member 11 in the same manner as the human vocal cords are operated and thus produce a clearer and more vibrant sound than could otherwise be obtained. This device accentuates and clarifies the notes from the sound box, and the dampening effect of the fabric within the horn and extension modifies the tone so that there is no harshness of the resultant sound. The clarifying device 11 is preferably lined or covered with a suitable fabric 12, as is shown.

From the foregoing description, taken in connection with the accompanying drawings, the construction and operation of the invention will be readily understood without requiring a more extended explanation.

Various changes in the form, proportion and the minor details of construction may be resorted to without departing from the

principle or sacrificing any of the advantages of this invention as defined in the appended claims.

Having thus described my invention, what
5 I claim and desire to secure by Letters Patent is:—

10 1. A phonograph horn having a foraminous fabric arranged over the mouth thereof, means to hold said fabric in place upon the horn, and a sound tube carried by said means and communicating with the interior of the horn through the foraminous fabric.

2. A phonograph horn having a U-shaped longitudinally disposed accentuating and clarifying device located therein, and a dampening fabric covering said device. 15

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

GEORGE W. DUNCAN.

Witnesses:

H. A. WHITE,
E. MIDILMAN.

C. BEECROFT.
AMPLIFYING HORN.
APPLICATION FILED MAY 29, 1905.

915,013.

Patented Mar. 9, 1909.

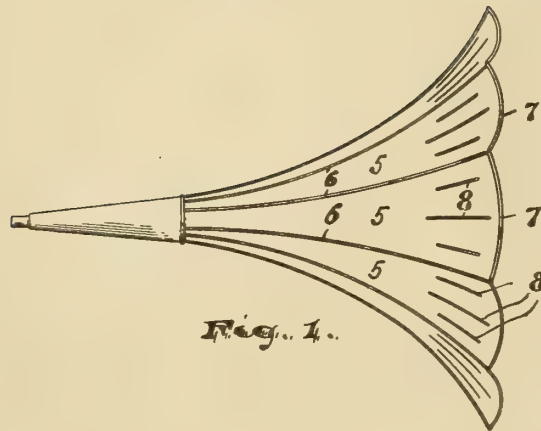


Fig. 1.

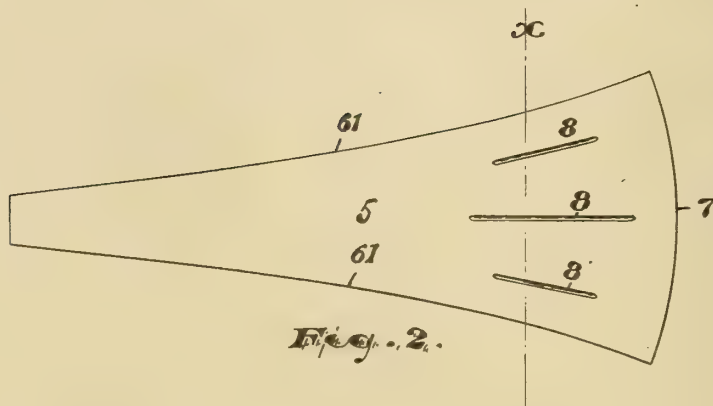


Fig. 2.



Fig. 3.

WITNESSES

Ralph Lancaster
Russell M. Everett.

INVENTOR:

Clement Beecroft,
BY
Charles H. Bell,
ATTORNEY:

UNITED STATES PATENT OFFICE.

CLEMENT BEECROFT, OF PHILADELPHIA, PENNSYLVANIA.

AMPLIFYING-HORN.

No. 915,013.

Specification of Letters Patent.

Patented March 9, 1909.

Application filed May 29, 1905. Serial No: 262,714.

To all whom it may concern:

Be it known that I, CLEMENT BEECROFT, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Amplifying-Horns; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to characters of reference marked thereon, which form a part of this specification.

This invention relates to that class of amplifying horns for talking machines in which a series of sections of metal are united by suitable joints common in metal joining and given the form of a flower, more particularly the flower known as the "morning glory", the sides of the horn flaring outwardly toward its large end upon curved lines. These horns are, further, formed of a series of longitudinal strips, each of which has its opposite edges diverging upon curved lines, and is before assembling bent into a curved shape, such curvature increasing toward the wide end of the strip.

The objects of the invention are to cause the individual strips to properly retain their curvature as formed or stamped until they are finally joined together in the complete horn; to prevent their distortion before, or while being assembled; to thus facilitate the operation of assembling the strips into a complete form and save time and labor; to obtain a more finished product or perfect horn; to enable by these means, light thin sheet metal to be employed without in any way detracting from the appearance or utility of the horn; to lessen the cost of such amplifying horns, and to obtain other advantages and results as may be brought out in the following description.

The invention consists in the improved amplifying horn, and in the arrangements and combinations of parts of the same, all substantially as will be hereinafter set forth and finally embraced in the clauses of the claim.

Referring to the accompanying drawings, in which like characters of reference indicate corresponding parts in each of the several figures, Figure 1 is a side elevation of my improved horn, Fig. 2 is a plan of one of the sec-

tions thereof before insertion, and Fig. 3 is a transverse section of the same taken at line x.

It will be understood that in horns of the construction herein set forth the longitudinal strips are made of sheet metal as thin and light as possible, so that the horns will be neither heavy to handle, nor too expensive. Each of the strips 5, referring to the drawings, is first stamped out in a flat blank, and is then pressed or longitudinally bent into its curved form as shown, and the edges 6, formed preparatory to assembling the requisite number of strips into a complete horn. Heretofore it has been difficult in such manufacture to have the individual strips properly retain their curvature as so formed or pressed, until they were finally joined together in the complete horn; said strips, being light, narrow and flexible, were liable to become warped or distorted, so that the assembling of them into a horn involved more labor or the uniformity of the horn was impaired, and to overcome this difficulty is the chief purpose of my invention. To this end, in forming or pressing each strip 5, into its curved shape, ridges or ribs 8, are created therein, which are so located as to retain the light sheet metal in its curved form by reason of the increased stiffness thereby imparted. These ribs are placed where they are most needed, to wit, at or near the broad end 7, of the strip, where its increased curvature is located, as shown in the drawings. The ribs 8, may be of any configuration or dimensions desired, although one of the simplest and most efficacious forms is that shown in the drawing, viz., three ribs spaced longitudinally of the strip or section and extending across the point of sharpest curvature of the strip. These ridges or ribs thus "set," as it were, the strip or section in its newly pressed form, and assist it in retaining the same until assembled. Moreover, the said ribs are in no way objectionable in the completed form, since they not only give greater strength and rigidity to the broad ends of the longitudinal sections, which are more likely than any other part to become bent or bruised when the horn is set upon the floor, but furthermore the ribs are a considerable feature of ornamentation to the horn. Obviously, said ridges or ribs 8, may project on either side of the strips 5, as desired, but I prefer to force them outwardly with respect to the chamber of the horn, as I have shown in the drawings.

Preferably each and every one of the longitudinal strips in the horn is provided with ribs or ridges which I have described, so that they retain their proper curvature while being assembled. Obviously, however, if it should be desired for ornamentation or the like, some of the strips, as for instance the alternate ones, could be left plain, and those at the sides of the plain ones depended upon for bringing the plain strips to the proper curvature while forming a complete horn. I prefer, however, to form the ribs or ridges upon every individual strip of the horn, since this procures the best results.

Having thus described the invention, what I claim as new is:—

1. An amplifying horn having a body portion flaring on curved lines and composed of a series of longitudinal strips whose correspondingly curved edges are secured together, one of said strips having a narrow longitudinal portion of itself displaced outwardly from the body portion of the strip and forming on the outside of the horn an integral rib and on the inside a groove, said displaced longitudinal portion being located at a distance from the edges of the strip and terminating

at its ends at a distance from the ends of the strip.

2. An amplifying horn having a body portion flaring on curved lines which increase in curvature near the large end of said flaring body portion and being composed of longitudinal strips having outwardly diverging curved edges by which they are joined together, one of said strips having at its broad end a series of narrow longitudinal portions of itself displaced outwardly from the body portion of the strip and forming on the outside of the horn integral ribs and on the inside grooves, said series of displaced longitudinal portions being located at a distance from the edges of the strip and extending across the part of greatest curvature in the length of the strip terminating at their opposite ends short of the ends of the strip.

In testimony, that I claim the forgoing, I have hereunto set my hand this sixteenth day of May 1905.

CLEMENT BEECROFT.

Witnesses:

CHARLES H. PELL,
RUSSELL M. EVERETT.



D. S. EDMONDS.
TALKING MACHINE.
APPLICATION FILED NOV. 19, 1907.

915,022.

Patented Mar. 9, 1909.

Fig. 1,

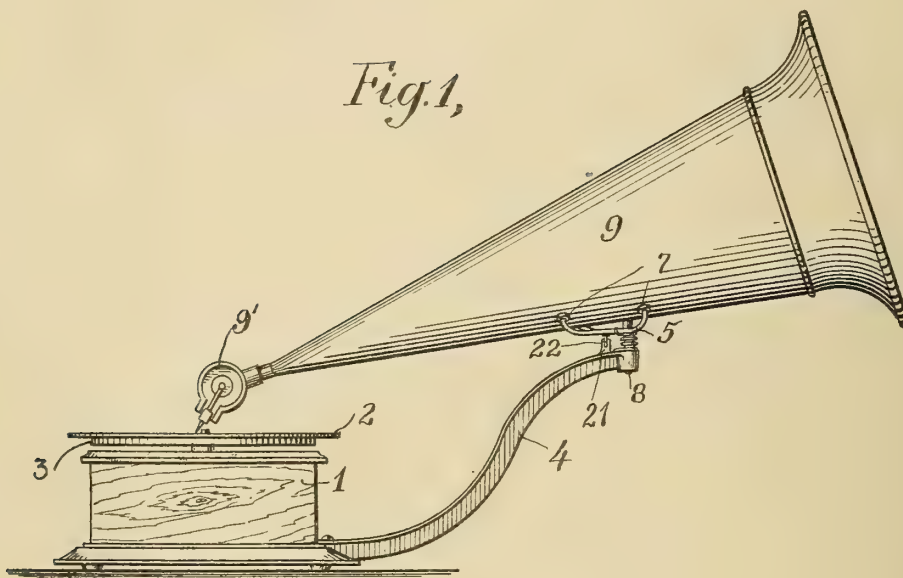


Fig. 2,

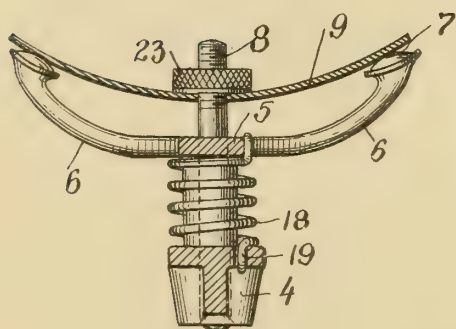


Fig. 3,

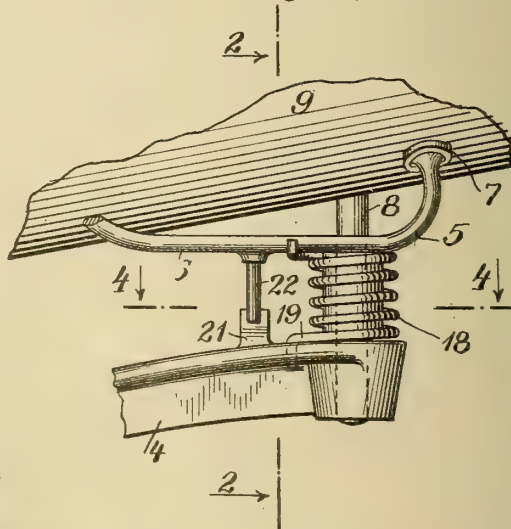
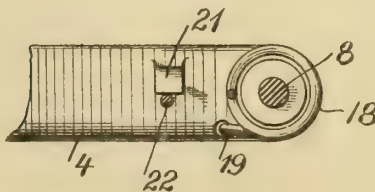


Fig. 4,



WITNESSES:

J. M. Intosh
J. Battlett

INVENTOR

Dan A. Edmonds
BY
P. C. Edmonds
ATTORNEYS

UNITED STATES PATENT OFFICE.

DEAN S. EDMONDS, OF NEW YORK, N. Y., ASSIGNOR, BY MESNE ASSIGNMENTS, TO HAWTHORNE & SHEBLE MANUFACTURING COMPANY, OF PHILADELPHIA, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

TALKING-MACHINE.

No. 915,022.

Specification of Letters Patent.

Patented March 9, 1909.

Original application filed January 31, 1907, Serial No. 354,972. Divided and this application filed November 19, 1907, Serial No. 402,906.

To all whom it may concern:

Be it known that I, DEAN S. EDMONDS, a citizen of the United States, residing in the borough of Manhattan, in the city, county, and State of New York, have invented a certain new and useful Improvement in Talking-Machines, of which the following is a specification.

This invention relates to talking-machines, particularly those of the type employing a disk sound-record.

The invention is directed to the provision of means for exerting a yielding pressure upon the part carrying the reproducing mechanism, to move the latter across the grooved portion of the record disk, rather than permitting the sound-box to be propelled across the disk by the record-groove.

In accordance with the invention, the reproducing mechanism is moved across the disk by the yielding-pressure device in correspondence with the rotation of the disk, so that the stylus will track in the record-groove and give a faithful reproduction of the recorded sound, the sound-box being restrained against too rapid movement by the wall of the record-groove toward the end of the spiral. The provision of such a yielding-pressure device for feeding the stylus across the record offers many advantages; the stylus will move automatically under the pressure into the beginning of the record-groove, the wear on the record is materially decreased, and when a groove-wall is worn through the machine will not repeat. In accordance with the invention, a spring is employed for providing the yielding pressure. The reproducing mechanism may be secured to one end of a sound-conveying device, such as a tone-arm or amplifying-horn, and this device may be pivotally mounted upon a suitable support adjacent to the holder for the sound-record. The spring is preferably arranged between this support and the sound-conveying device and exerts yielding pressure on the latter to turn it about its pivot so as to move the reproducing mechanism across the record. With such a spring, I also employ means for precluding movement of the sound-box entirely across the record to the center thereof. Such means is of importance, in order to guard against injury to the stylus and sound-box,

for if the reproducing mechanism were moved by the yielding-pressure device beyond the end of the record-groove, the stylus and the lever carrying the same might engage the shaft of the record-holder or such a projection as is sometimes provided on the holder extending through an opening in the record.

I have illustrated an embodiment of my invention in the accompanying drawings, in which—

Figure 1 is an elevation of a talking-machine; Fig. 2 is a section through the support and cradle on line 2—2 of Fig. 3; Fig. 3 is an enlarged detail view of some of the parts shown in Fig. 1; and Fig. 4 is a detail view in section on line 4—4 of Fig. 3.

Referring to these drawings, the machine comprises a motor-box 1 having therein a suitable motor driving a turntable 2, on which rests the record-disk 3 having a record-groove therein on one or both of its faces. Secured to the box is an outwardly-extending supporting arm 4 having a vertically disposed opening through its outer end. A cradle 5, having arms 6 with pads 7 on their ends, has a downwardly extending pin 8 secured thereto and extending into the opening in the arm 4, this pin serving as a pivot about which the cradle 5 and the sound-conveying tube 9 carried thereby turn. Pin 8 may also be extended upwardly through an opening in tube 9, and the tube may be secured thereto by a nut 23, as shown in Fig. 2. A spring 18 is coiled about the pivot 8 of the cradle 5 and the end of arm 4, one end 19 of this spring being secured in an opening in the arm 4 and the other being caught around a part of the cradle 5. In order to arrest the movement of the cradle 5 and the horn 9 and reproducing mechanism 9' carried thereby when the stylus of the reproducing mechanism has reached the end of the record-groove, contacting surfaces are provided on the cradle or a part moving therewith and upon the support for the cradle, which surfaces are brought into engagement at the conclusion of the reproduction to arrest further movement. Thus, a projection 21 is shown as formed upon the arm 4 and extending upwardly therefrom, and a pin 22 is provided depending from the cradle 5 in position to engage the projection 21. These parts are so

positioned that they come into engagement immediately after the stylus reaches the end of the record-groove, so as to preclude further turning movement of the cradle 5 under the influence of spring 18. As thus constructed, when the motor is started and the stylus point positioned at the beginning of the record-groove, the spring 18 will exert yielding pressure upon the cradle 5, the sound-conveying device 9 and the reproducing mechanism secured upon the end of the latter, to move the reproducing mechanism across the record in correspondence with the rotation of the latter, too rapid movement of the reproducing mechanism being precluded by the coaction of the stylus with the wall of the record-groove. The pressure exerted by the spring is a yielding one, and the spring is restored to potential relation in restoring the reproducing mechanism to its initial position for coaction with the beginning of the record-groove again. With this construction, great care in positioning the stylus-point at the beginning of the groove is unnecessary, as the point may be placed on the plane portion of the disk beyond the groove and the spring will carry it over and into the groove, thereby assuring the reproduction of the entire announcement and selection. With such a yielding-pressure device, the wear on the record-groove is considerably less and when a wall of the groove has been worn through repetition of the recorded sounds in the groove adjacent to this wall will not take place. At the conclusion of the reproduction, the stops 21 and 22 come into engagement to preclude further turning movement of the reproducing mechanism under the influence of spring 18.

Having now described my invention, what I claim as new therein and desire to secure by Letters Patent is as follows:—

1. In a talking-machine, the combination of a holder for a disk sound-record and means for rotating the same and the record thereon, reproducing mechanism including a stylus, a pivoted sound-conveying device carrying said mechanism, and a coiled spring concentric with the pivot of said device and exerting a yielding pressure thereon to move the same about its pivot and carry the said mechanism across the record, said stylus being restrained in such movement by the record-groove and said spring being restored to potential relation in restoring said device to initial position, substantially as set forth.

2. In a talking-machine, the combination of a motor-box, a turntable supported thereon, a disk sound-record on said turntable, an arm secured to and extending outwardly from said box, a sound-conveying tube pivotally mounted on said arm, a sound-box carried thereby and having a stylus bearing in the record-groove, and a

spring connected at one end to said arm and at the other to said tube for exerting a yielding pressure on the tube to turn it on its pivot and carry the stylus across the record, said stylus being restrained in such movement by the record-groove, substantially as set forth. 70

3. In a talking-machine, the combination of a motor-box, a turntable supported thereon, a disk sound-record on said turntable, an arm secured to and extending outwardly from said box, a sound-conveying tube pivotally mounted on said arm, a sound-box carried thereby and having a stylus bearing in the record-groove, a spring connected at one end to said arm and at the other to said tube for exerting a yielding pressure on the tube to turn it on its pivot and carry the stylus across the record, said stylus being restrained in such movement by the record-groove, and stops for arresting the movement of the tube and stylus after the latter has reached the end of the record-groove, substantially as set forth. 85

4. In a talking-machine, the combination of a holder for a sound-record, means for rotating the same and the record thereon, a support, a sound-conveying device pivotally mounted on said support, reproducing mechanism including a stylus carried by said device, a spring exerting yielding pressure on said device to move the reproducing mechanism across the sound-record so that the stylus may track in and be restrained by the record-groove, said spring being restored to potential relation in restoring said device to initial position, and surfaces on said support and device brought into engagement by the movement of said device under the influence of said spring to arrest the movement of the reproducing mechanism, substantially as set forth. 105

5. In a talking-machine, the combination of a motor-box, a turntable supported thereon, a disk sound-record on said turntable, an arm secured to and extending outwardly from said box, a cradle having a plurality of outwardly extending supporting-arms pivotally mounted on the end of said arm, a horn tapered from end to end supported on the ends of the supporting-arms of said cradle, a sound-box secured on the smaller end of said horn having a stylus tracking in the groove in said sound-record, and means associated with said arm and cradle for exerting yielding pressure on said horn to move said sound-box in a plane substantially parallel to the surface of the sound-record so that the stylus thereof may track in and be restrained by the record-groove, substantially as set forth. 125

6. In a talking-machine, the combination of a motor-box, a turntable supported thereon, a disk sound-record on said turntable having a laterally-undulating record-groove 130

of substantially uniform depth therein, an arm secured to and extending outwardly from said box, a cradle having a plurality of outwardly-extending supporting-arms pivotally mounted on the end of said arm, a horn tapered from end to end secured upon the supporting-arms of said cradle, a sound-box secured on the smaller end of said horn having a stylus tracking in the groove in said sound-record, and means between said arm and cradle for exerting yielding pressure on said horn to move said sound-box across said

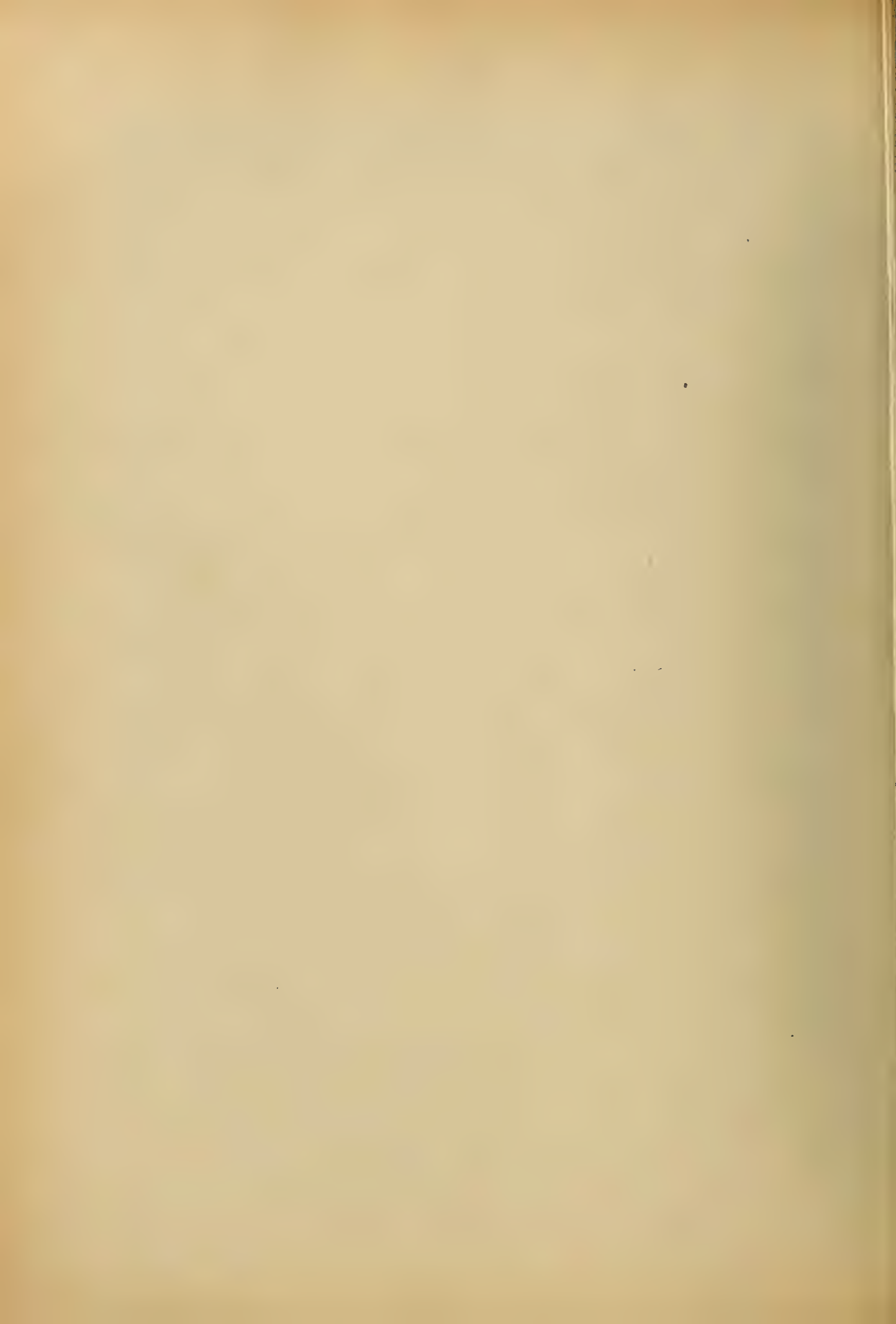
sound-record so that the stylus thereof may track in and be restrained by the record-groove, said means being so arranged that restoring said sound-box to its initial position restores said means to potential position, substantially as set forth. 15

This specification signed and witnessed this 2d day of November, 1907.

DEAN S. EDMONDS.

Witnesses:

I. BARTLETT,
I. McINTOSH.



C. E. & W. H. KRUEGER.
MAGAZINE TALKING MACHINE.
APPLICATION FILED JAN. 11, 1908.

915,448.

Patented Mar. 16, 1909.

13 SHEETS—SHEET 1.

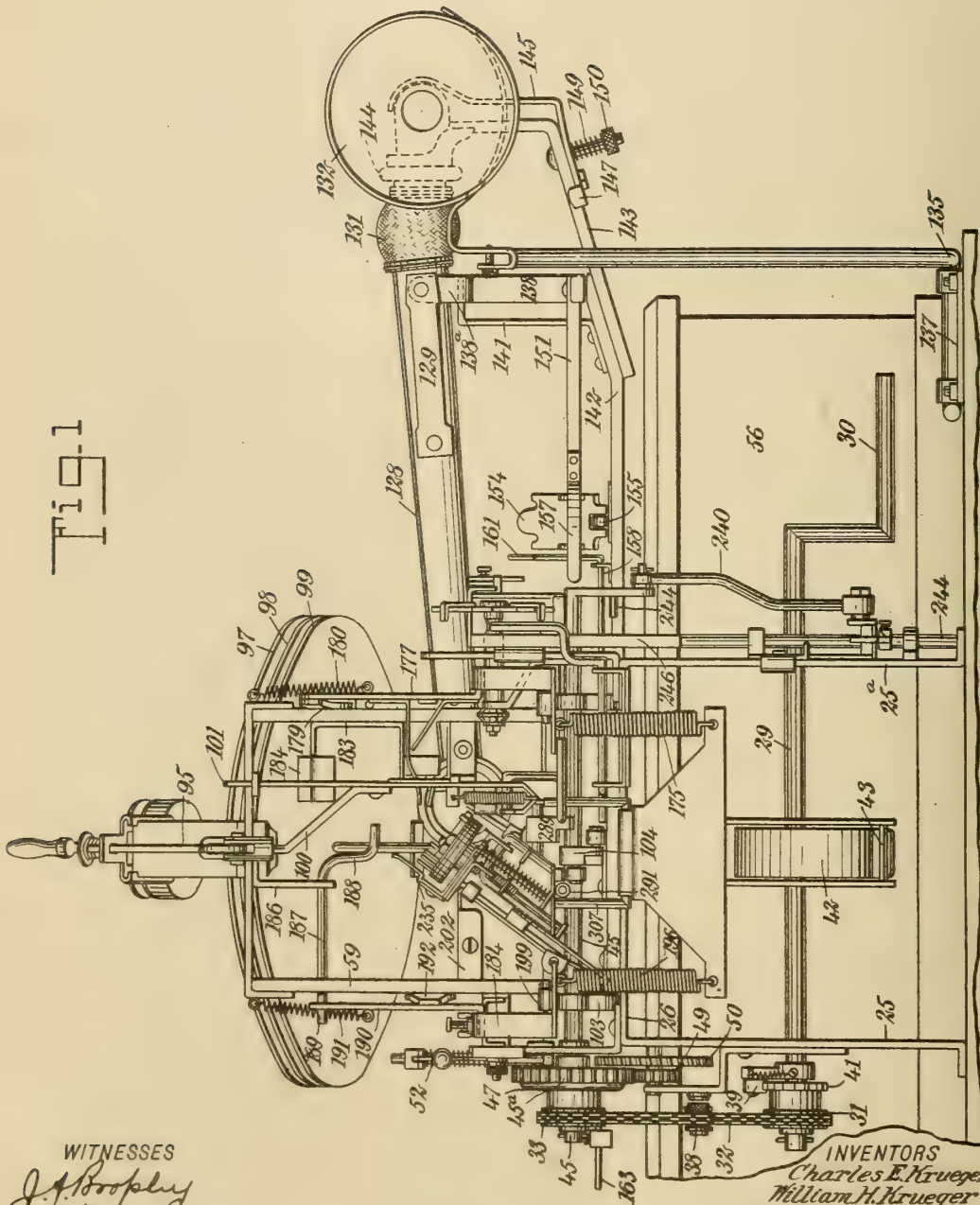


Fig. 1

WITNESSES

J. J. Brophy
Walton Harrison

INVENTORS
Charles E. Krueger
William H. Krueger
BY *Mum Co.*
ATTORNEYS



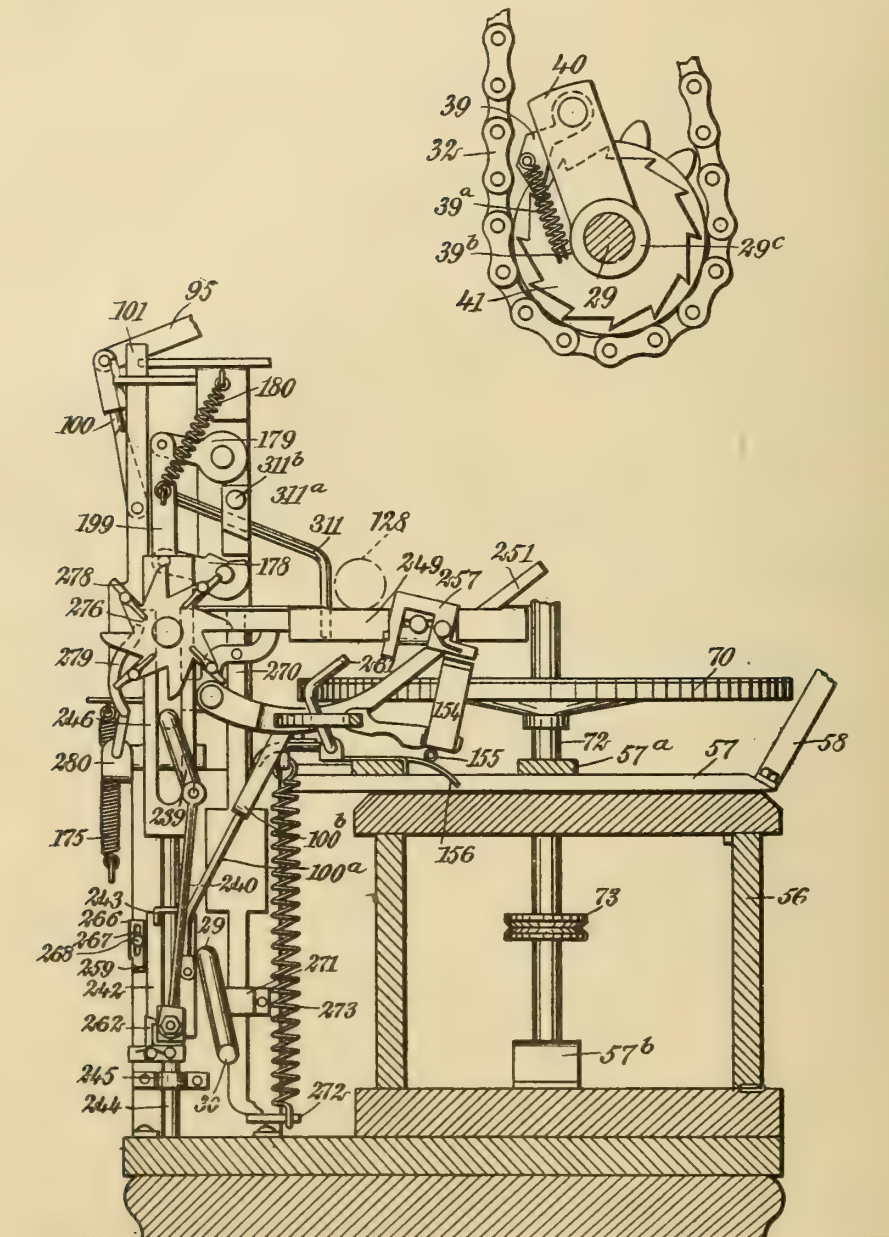
C. E. & W. H. KRUEGER.
MAGAZINE TALKING MACHINE.
APPLICATION FILED JAN. 11, 1908.

915,448.

Patented Mar. 16, 1909.

12 SHEETS—SHEET 3.

Fig. 17



WITNESSES
J. A. Prophy
Walton Harrison

Fig. 3

INVENTORS
Charles E. Krueger
William H. Krueger
BY *Mum Co.*

ATTORNEYS

C. E. & W. H. KRUEGER.
MAGAZINE TALKING MACHINE.
APPLICATION FILED JAN. 11, 1908.

915,448.

Patented Mar. 16, 1909.

12 SHEETS—SHEET 4.

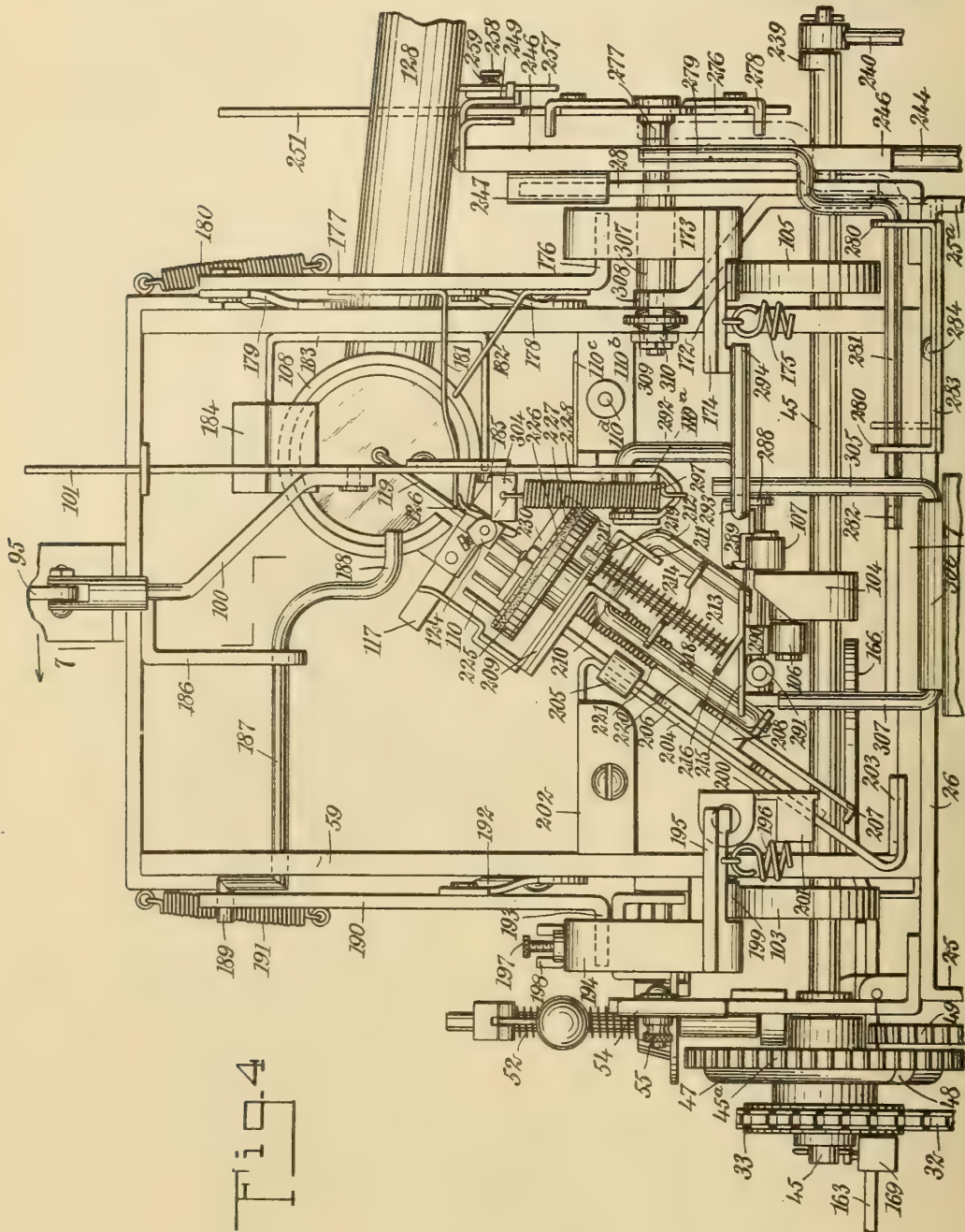


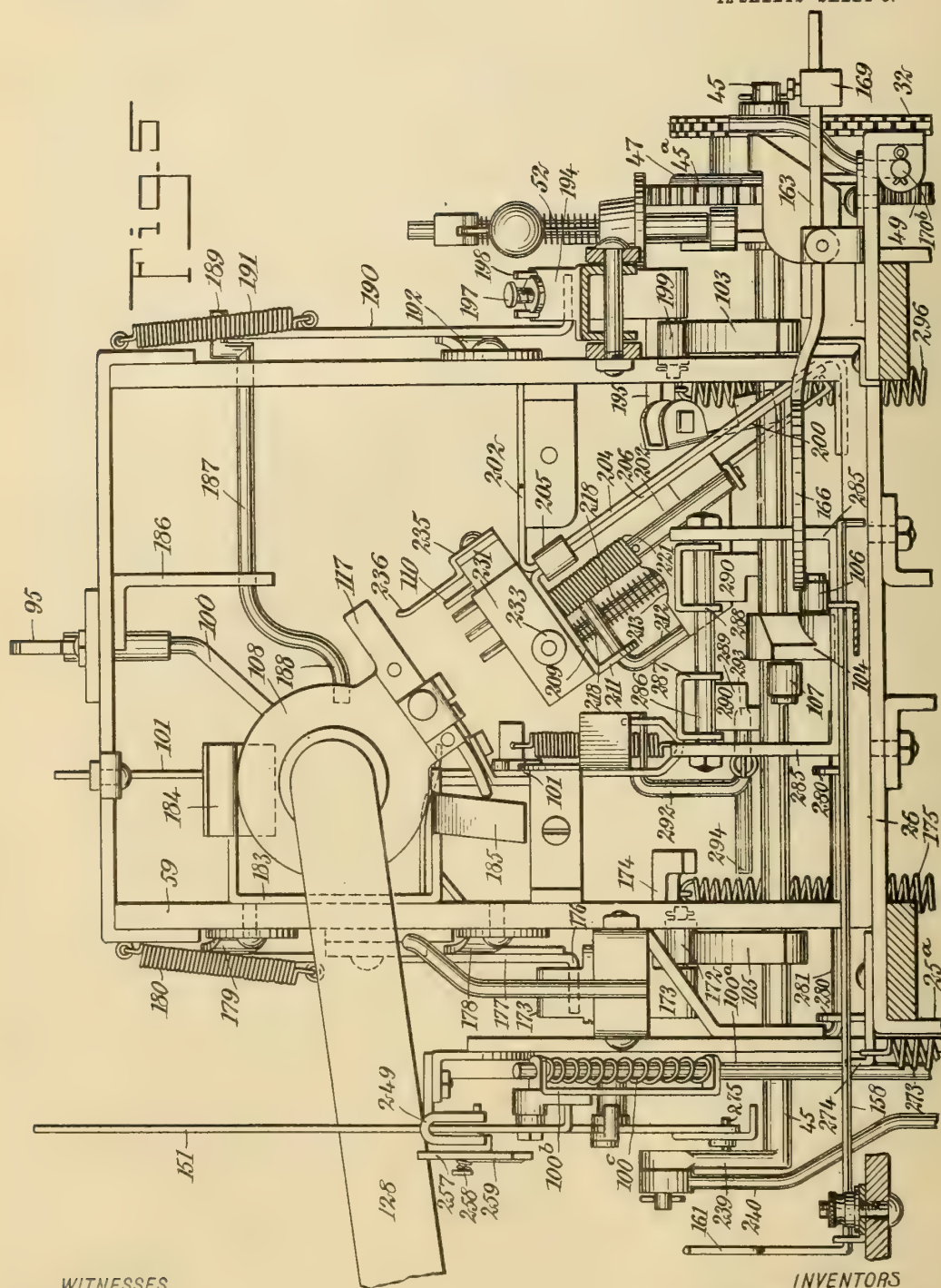
Fig. 4

WITNESSES
J. A. Brophy
Walter Harrison

INVENTORS
Charles E. Krueger
William H. Krueger
BY *Mum & Co*
ATTORNEYS

915,448.

12 SHEETS—SHEET 5.



WITNESSES

J. A. Brophy
Walton Harrison

INVENTORS

Charles E. Krueger
William H. Krueger

BY

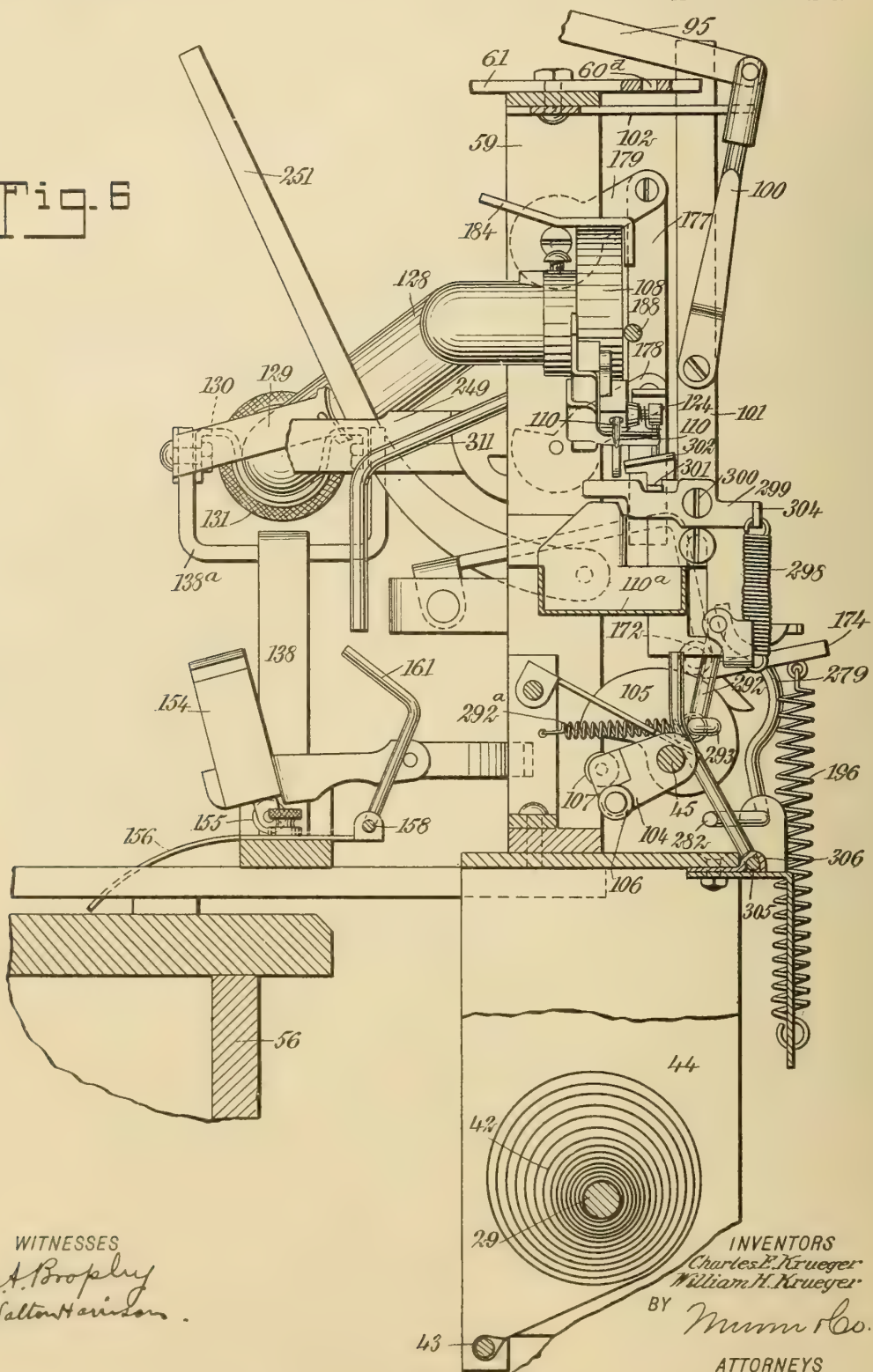
Mumukshu

ATTORNEYS

915,448.

12 SHEETS—SHEET 6.

Fig. 6



WITNESSES

J. A. Brophy
Walton Harrison.

INVENTORS

Charles E. Krueger
William H. Krueger

BY *Mum Co.*

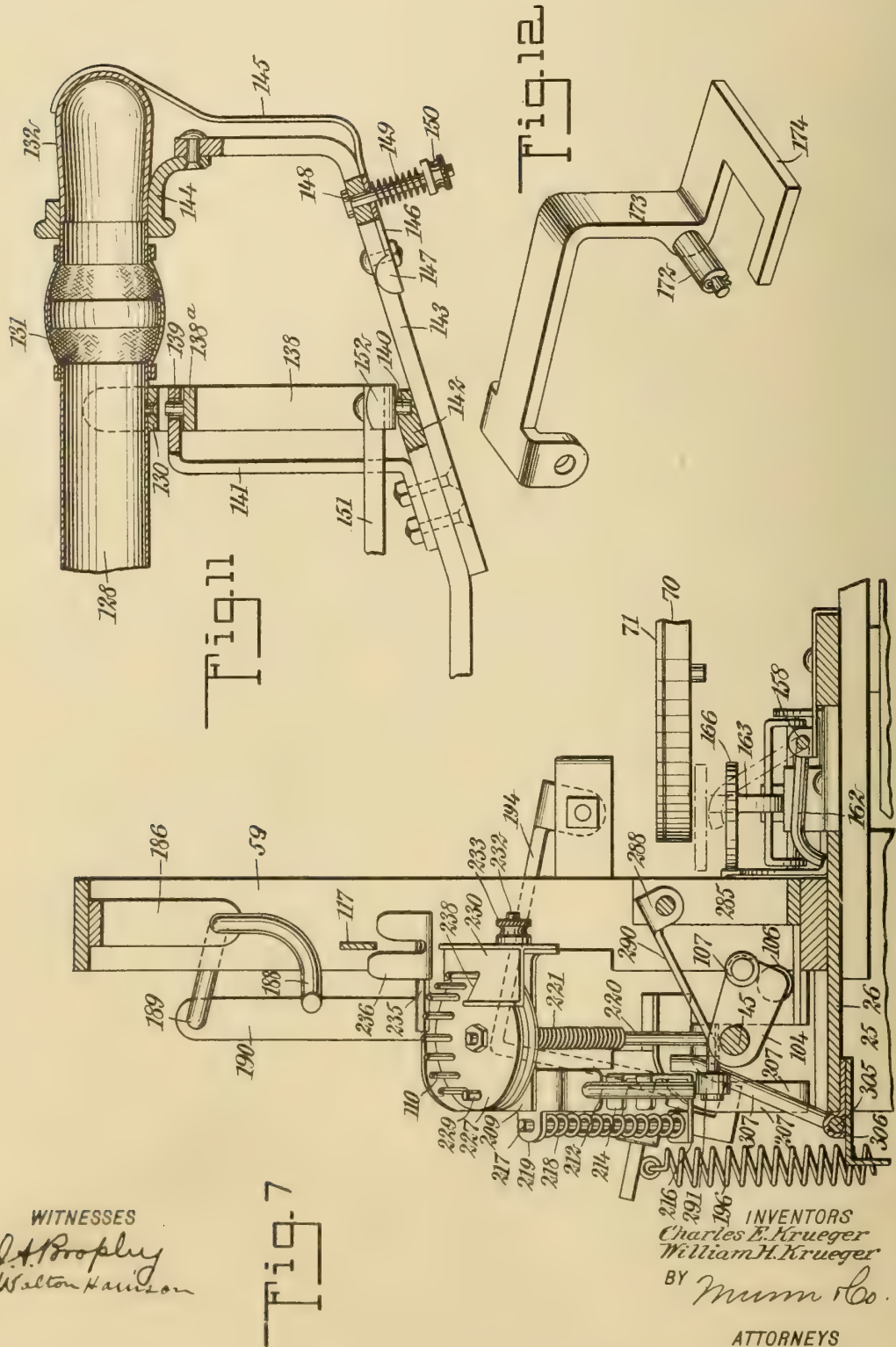
ATTORNEYS

C. E. & W. H. KRUEGER.
MAGAZINE TALKING MACHINE.
APPLICATION FILED JAN. 11, 1908.

Patented Mar. 16, 1909.

12 SHEETS—SHEET 7.

915,448.



WITNESSES
J. A. Brophy
Walton Harrison

INVENTORS
Charles E. Krueger
William H. Krueger
BY *Munn Co.*

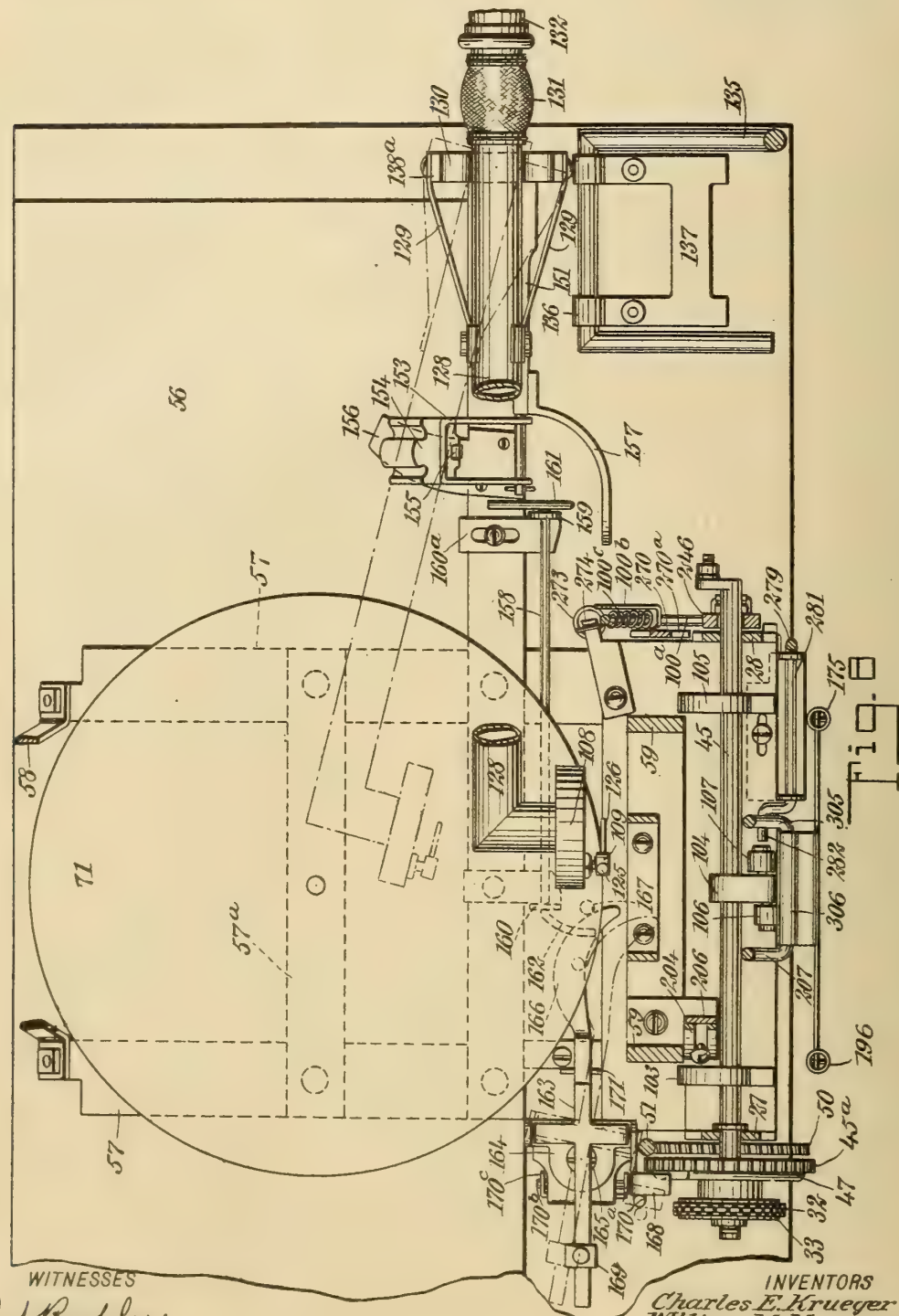
ATTORNEYS



C. E. & W. H. KRUEGER.
MAGAZINE TALKING MACHINE.
APPLICATION FILED JAN. 11, 1908.

Patented Mar. 16, 1909.

12 SHEETS—SHEET 8.



WITNESSES

J. T. Brophy
Walter Harrison

INVENTORS

Charles E. Krueger
William H. Krueger

BY

Mum Co.

ATTORNEYS

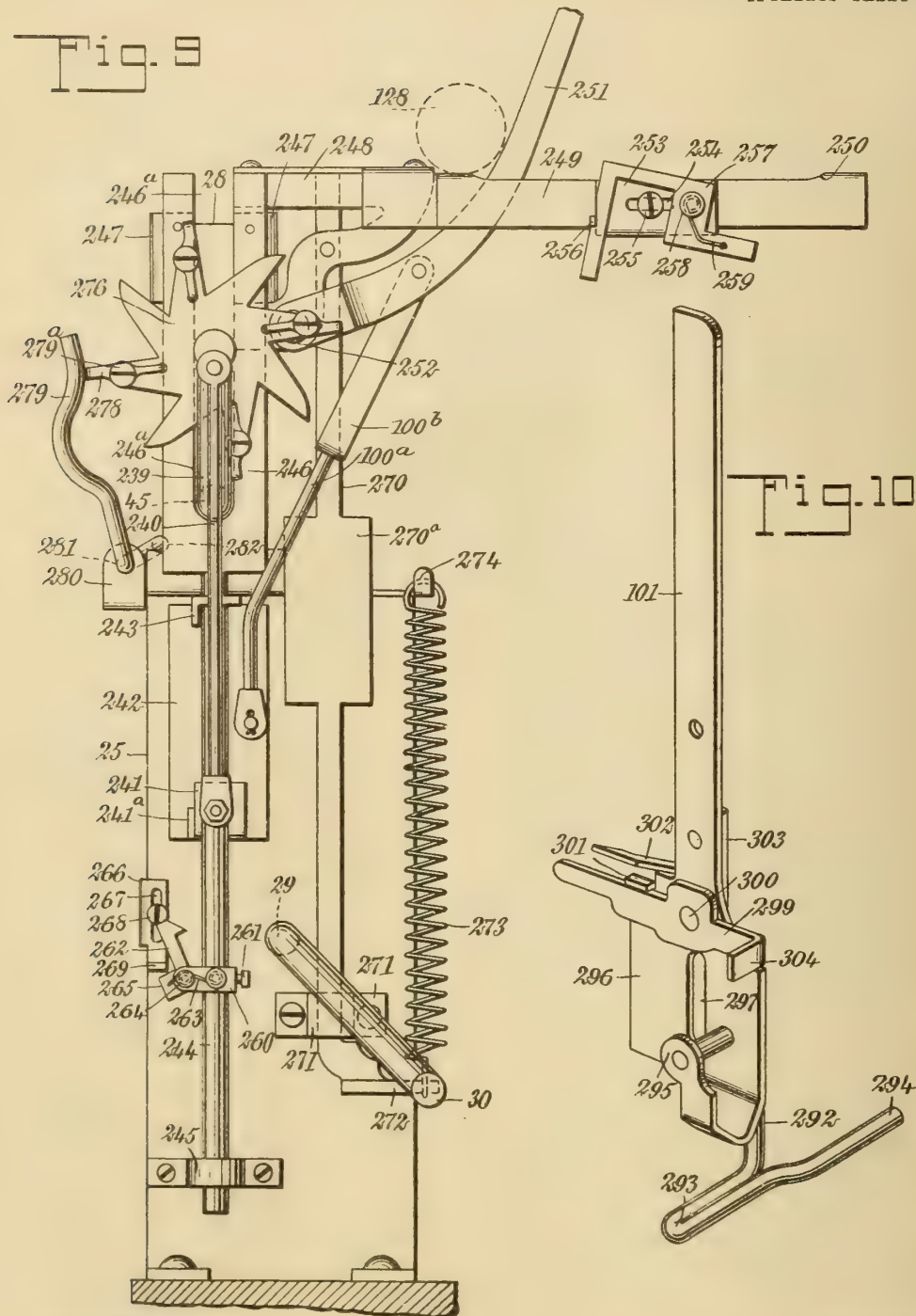
C. E. & W. H. KRUEGER.
MAGAZINE TALKING MACHINE.
APPLICATION FILED JAN. 11, 1908.

915,448.

Patented Mar. 16, 1909.

12 SHEETS—SHEET 9.

Fig. 8



WITNESSES

J. A. Brophy
Walton Harrison

INVENTORS

Charles E. Krueger
William H. Krueger

BY *Mumford & Co.*

ATTORNEYS



C. E. & W. H. KRUEGER.
MAGAZINE TALKING MACHINE.
APPLICATION FILED JAN. 11, 1908.

915,448.

Patented Mar. 16, 1909.

12 SHEETS—SHEET 10.

Fig. 13

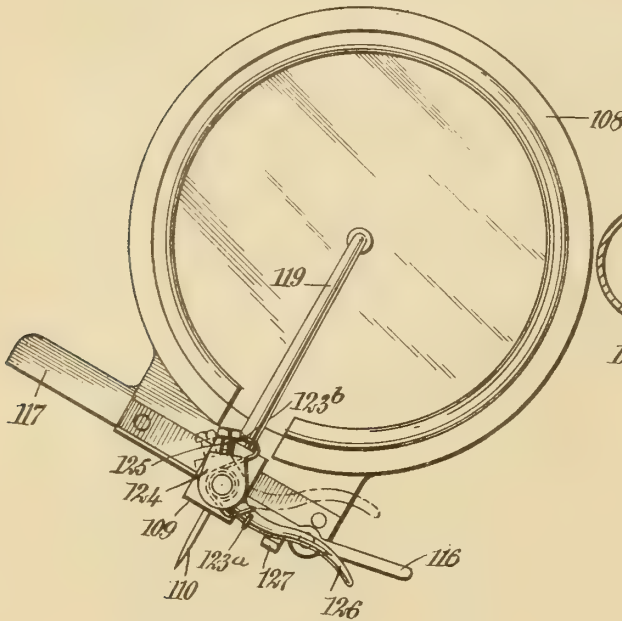


Fig. 14

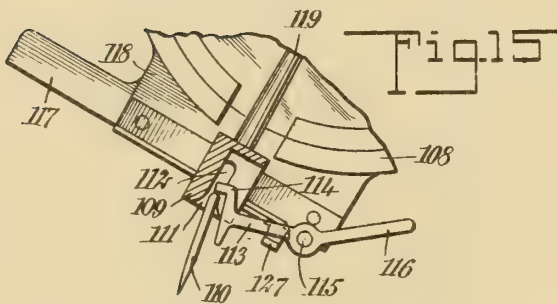
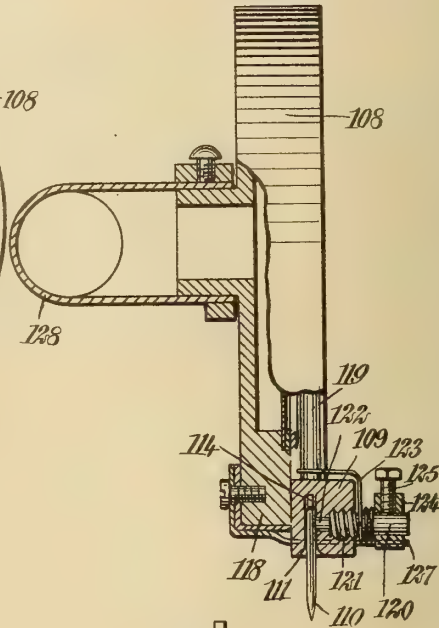


Fig. 16

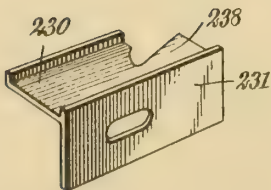
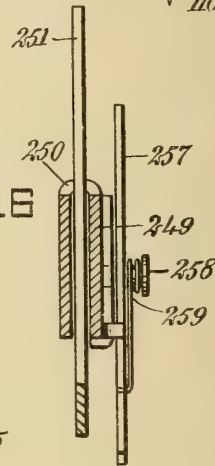


Fig. 22

WITNESSES

J. A. Brophy
Walton Harrison

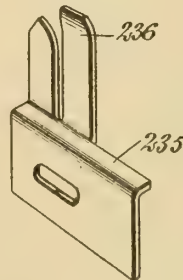


Fig. 23

INVENTORS
Charles E. Krueger
William H. Krueger
BY Munn & Co.
ATTORNEYS

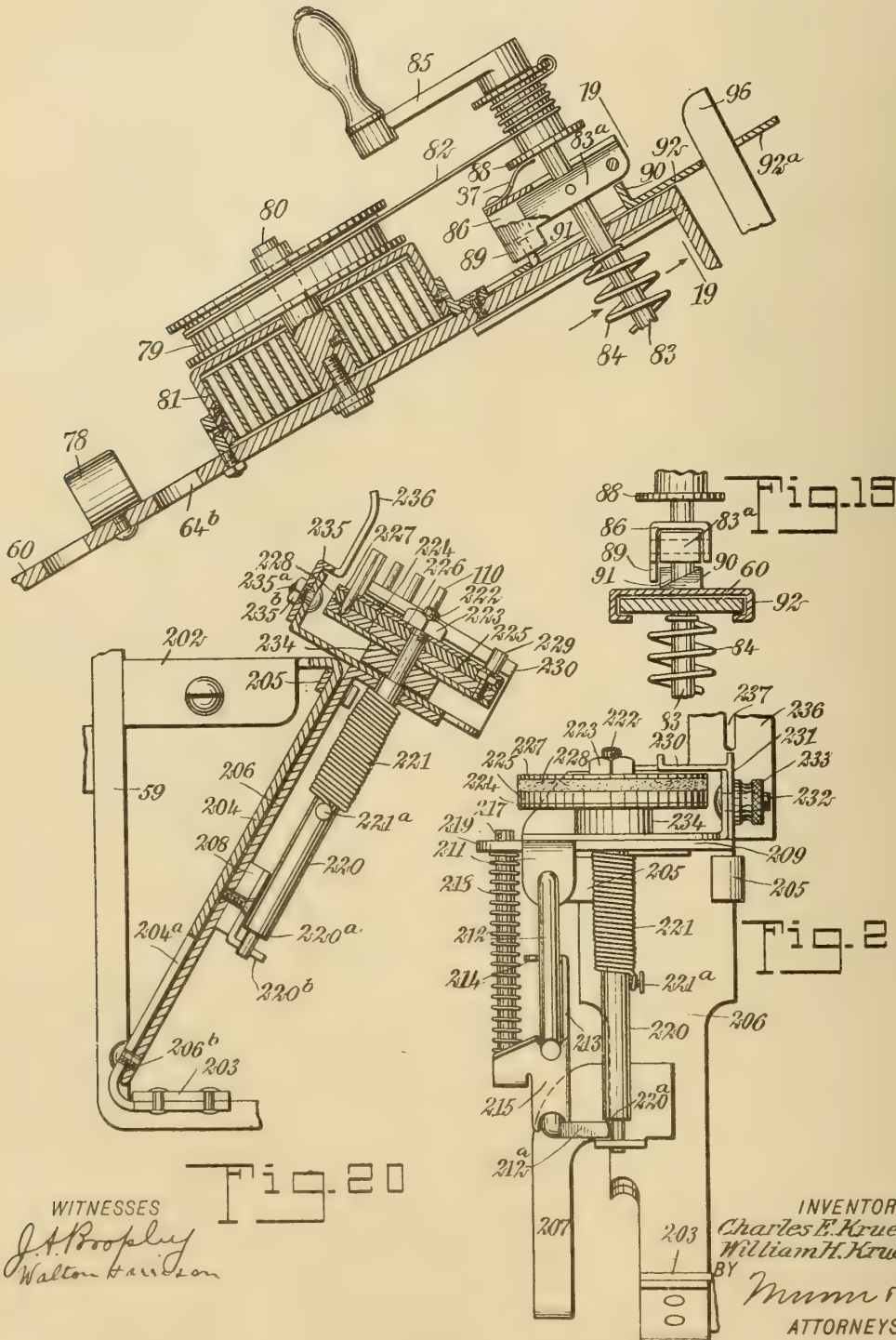


C. E. & W. H. KRUEGER.
MAGAZINE TALKING MACHINE.
APPLICATION FILED JAN. 11, 1908.

Patented Mar. 16, 1909.
12 SHEETS—SHEET 11.

915,448.

Fig. 18



WITNESSES
J. A. Brophy
Walton Harrison

INVENTORS
Charles E. Krueger
William H. Krueger
BY *Mum Co.*
ATTORNEYS



C. E. & W. H. KRUEGER.
MAGAZINE TALKING MACHINE.
APPLICATION FILED JAN. 11, 1908

915,448.

Patented Mar. 16, 1909.

12 SHEETS—SHEET 12.

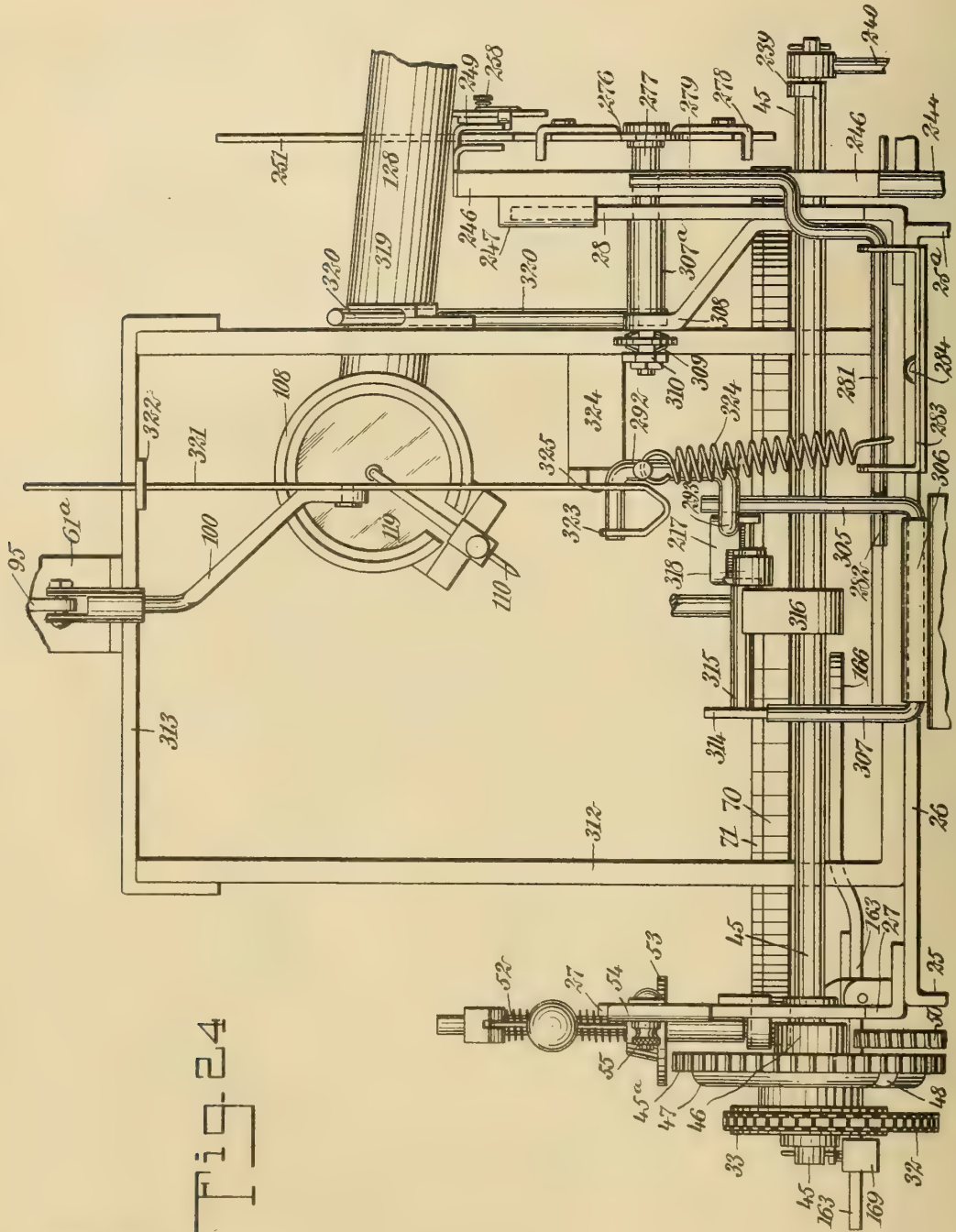


Fig. 24

WITNESSES

J. A. Brophy
Walton & Anderson

INVENTORS

Charles E. Krueger
William H. Krueger

BY

Mum & Co.

ATTORNEYS

UNITED STATES PATENT OFFICE.

CHARLES E. KRUEGER AND WILLIAM H. KRUEGER, OF MINNEAPOLIS, MINNESOTA.

MAGAZINE TALKING-MACHINE.

No. 915,448.

Specification of Letters Patent.

Patented March 16, 1909.

Application filed January 11, 1908. Serial No. 410,383.

To all whom it may concern:

Be it known that we, CHARLES E. KRUEGER and WILLIAM H. KRUEGER, both citizens of the United States, and residents of Minneapolis, in the county of Hennepin and State of Minnesota, have invented a new and Improved Magazine Talking-Machine, of which the following is a full, clear, and exact description.

10 Our invention relates to talking machines, our purpose being to produce a device in which a large number of distinct operations are performed automatically, so that the machine requires a minimum of attention.
15 To this end our invention embodies the following objects: I. To provide a magazine for holding a number of separate records and means for changing these records so that they are played in a predetermined order of
20 succession, the substitution of one record for another being made automatically by the machine. II. To provide mechanism whereby a needle, when used upon one record may be discarded and a new needle substituted for
25 use upon the next successive record, the substitution of this needle being performed automatically by the machine. III. To enable the operator, by an adjustment of certain parts of the machine, to change the action thereof so
30 that each record may be played twice in succession before the substitution of another record, and each needle may be used twice before the substitution of another needle. IV.
35 To enable certain parts to be disengaged from the main apparatus, thereby enabling any record or records to be repeated as many times as desired, new needles being substituted automatically for those already used.
40 V. To enable the magazine of the machine to be adjusted so as to accommodate large or small records as desired. VI. To enable certain parts of the machine to be thrown out of action at will so that the records may be changed automatically, a single needle being
45 used to operate upon all of the records in succession.

Reference is to be had to the accompanying drawings forming a part of this specification, in which similar characters of reference
50 indicate corresponding parts in all the figures.

55 Figure 1 is a front elevation of the talking machine, this view showing at the right the phonographic horn, at its top a number of disk records to be dropped one at a time upon the turntable, and showing at its middle and

bottom portions the gearing and various parts operated thereby. Fig. 2 is a side elevation, parts being broken away, this view showing more particularly the manner in which the several records are temporarily supported and how they are dropped one at a time upon the turntable. Fig. 3 is a fragmentary section through the casing showing the turntable and various moving parts not connected directly with the turntable, and also showing a star-wheel and its connections for periodically throwing certain parts out of action when arranged by the operator to do so. Fig. 4 is a fragmentary front elevation of the machine showing particularly the needle wheel serving as a magazine for holding the needles, this view further showing the various parts for moving the needle wheel bodily toward the needle holder, and still further showing the various parts used for causing the ejection of a needle already used and the automatic substitution therefor of a new needle. Fig. 5 is a fragmentary rear elevation, certain portions appearing in section, this view showing substantially the same portion of the mechanism as that disclosed in Fig. 4; Fig. 6 is a substantially central vertical section through the machine showing the sound box, the receptacle for holding the needles when ejected, and the various parts used for causing the ejection of the needles when used and the substitution therefor of new needles. Fig. 7 is a fragmentary section upon the line 7-7 of Fig. 4, looking in the direction of the arrow and showing the needle wheel and the accompanying parts whereby it is actuated; Fig. 8 is a plan view of the central portion of the apparatus, indicating in full and dotted lines various movements of the tube. This view further showing the mechanism whereby, upon the completion of a record, various automatic devices are thrown into action for the purpose of substituting the next record and changing the needle. Fig. 9 is a side elevation showing the star-wheel as the same would appear to an observer located at the right of Fig. 1, and further showing the movable rest for supporting the phonographic tube, and showing also the movable arm for shifting this tube in a lateral direction. Fig. 10 is a perspective of a slide upon which is mounted one of the levers used for extracting the old needle used in operating and inserting the needle holder for the purpose of changing the needles. Fig. 11 is a fragmentary section

through a portion of the phonograph horn and the phonograph tube, this view showing a flexible connection for these parts, and further showing various adjustments for the horn; Fig. 12 is a perspective of one of the cam levers and its shelf used for actuating the needle holder; Fig. 13 is an enlarged front elevation of the sound box and needle holder; Fig. 14 is an enlarged fragmentary section through the sound box and needle holder; Fig. 15 is an enlarged fragmentary section through a portion of the needle holder, this view showing the ejector for throwing out a needle after it has been used; Fig. 16 is an enlarged fragmentary section through a portion of the guide used for guiding the sound box into a predetermined position; Fig. 17 is a fragmentary section showing the ratchets mounted upon the main shaft for enabling the latter to be turned in order to wind up the main spring; Fig. 18 is an enlarged central section through the winding barrel and drum used for releasing the records one at a time, so as to drop them upon the turntable; Fig. 19 is a fragmentary section upon the line 19—19 of Fig. 18, looking in the direction of the arrow, and showing the escapement whereby movements of the magazine mechanism are checked periodically in order to prevent dropping of more than one record at a time; Fig. 20 is a central section through the needle wheel and its mountings showing how the needles are stored within the wheel; Fig. 21 is an enlarged elevation of the needle wheel and other parts shown in Fig. 20; Fig. 22 is a perspective of the needle guide, this part co-acting with the needle wheel for the purpose of stopping the needle wheel in such position that each needle arrives at exactly the same point in order to be more readily grasped by the needle holder; Fig. 23 is a perspective of the guide used for directing the bodily movements of the needle wheel and its accompanying parts relatively to the needle holder; Fig. 24 is a front elevation showing the device as provided with a different form of auxiliary frame, and as discarding certain parts so as to enable the machine to be used without the automatic change of needles after each record is played.

Standards 25, 25^a having a plate 26 integral therewith together constitute the main frame. Standards 27, 28 are mounted upon the main frame and project upwardly therefrom. The main shaft is shown at 29 and is provided with a handle 30 whereby it may be turned. Mounted rigidly upon the main shaft 29 is a sprocket gear 31 and engaging this sprocket gear is a sprocket chain 32. A sprocket gear 33 likewise engages the chain 32. A bracket 34 (see Fig. 2) is provided with a slot 35, and extending through the slot is a screw 36 engaged by a nut 37. By loosening the nut 37 by hand, the bracket may be

adjusted by moving it to the right or to the left according to Fig. 2, and when the adjustment is complete the nut 37 may be tightened. An idle sprocket gear 38 is revolvably mounted upon the bracket 34 and engages the sprocket chain 32. Our purpose in rendering the bracket 34 adjustable is to regulate the tension of the sprocket chain. Just below the idle sprocket gear 38 is a pawl 39 mounted upon a crank 40, the latter being rigid upon the main shaft 29. A spiral spring 39^a extends from this pawl to a pin 39^b, mounted upon the crank collar 39^c, see Fig. 17. A ratchet wheel 41 is likewise mounted rigidly upon the main shaft and is engaged by the pawl 39. The pawl is to prevent backward turning of the main shaft 29.

A main spring (see Fig. 6) is shown at 42 and is connected at one of its ends with a stationary pin 43, its other end being secured to the main shaft 29. This pin is mounted within a casing 44 which protects the spring. Whenever the main shaft 29 is turned by aid of the hand crank 30, the main spring 42 is wound up, and the main shaft 29 is unable to turn backward for the reasons above stated. A revoluble shaft 45 is provided with a gear 45^a having a hub 46 and being rigid relatively to the shaft. Mounted rigidly upon the gear 45^a is a cam 47 provided with a notch 48. This cam, except for the notch 48, is annular in shape. Disposed below the wheel 45^a and meshing therewith is a pinion 49 mounted rigidly upon a stub shaft 49^a. A worm gear 50 is also mounted rigidly upon this stub shaft. This worm gear engages a revoluble worm 51 forming a part of a governor 52. This governor is provided with a friction disk 53 and with a shoe 54 secured in position by aid of a screw 55. By aid of the screw 55 the shoe 54 may be adjusted, within reasonable limits, to any desired elevation upon the standard 27, the governor being thus set for different speeds. Hence, by adjusting the shoe 54 the speed of the entire apparatus may be controlled at will.

A wooden casing is shown at 56 and supported upon it are two bars 57, and across them extends a bar 57^a. Extending obliquely upward from the bars 57, is a brace 58. Opposite this brace and mounted upon the main frame is an upper frame 59. A flat bar 60 is secured to the brace 58 and is provided with bent portions 61, 61^a, the portion 61 being secured upon the top of the upper frame 59. Mounted upon the under side of the bar 60 is a supporting bracket 62 held in position by a screw 63 which passes through a slot 64. The bracket 62 is adjustable relatively to the bar 60 by aid of this slot and screw. Another bracket 65 is disposed upon the under side of the bar 60 and is provided with a body portion 66 held against the bar by aid of a bolt 67. The bar 60 is provided with holes 60^a, 60^b for the purpose of making

certain adjustments hereinafter described. Mounted upon the bent portion 61^a of the bar 60 is a bracket 68 held in position by a clamping bolt 69. This bracket 68 serves as a bearing, as will appear below. A turntable is shown at 70 and is provided with the usual felt surface 71 for supporting the record disks. This turntable is mounted upon a shaft 72 which extends directly upward through the turntable and which is journaled upon the bar 57^a and a bearing 57^b. Mounted upon this shaft is a pulley 73 whereby it and the turntable are rotated continuously. The upper end of the shaft 72 is provided with a boss 74 which is engaged by a rod 75. The lower end 76 of this rod is so shaped as to fit over the boss 74, as will be understood from Fig. 2. The rod 75 is provided with a portion 77 which is engaged by a clip 78 so as to hold the parts in position. By grasping the rod 75 it may be extricated from the clip 78 and moved upwardly, or, if need be, entirely removed from the machine in order to facilitate the removal and replacement of the record disks.

A drum 79 is mounted rigidly upon a revolvable stub shaft 80 and is disposed immediately above a spring barrel 81. A cord 82 is partially wound upon the drum 79, this cord being also partially wound upon a spool 88 secured upon a shaft 83. Mounted upon the shaft 83 is a spiral wire 84 serving as a screw thread and rigidly connected at its ends with the shaft 83. A hand crank 85 is mounted upon the upper end of the shaft 83 for the purpose of turning the same at will. Mounted rigidly upon the shaft 83 is a box 83^a, and pivoted upon the latter is a pawl 86 adapted to rock vertically. This pawl is provided upon its upper surface with a leaf spring 87 which engages the spool 88 secured upon the shaft 83. The pawl 86 is provided with a portion 89 projecting downwardly, and disposed partially within the path of this portion are two bosses 90, 91, carried by a slide 92 and rigid in relation to the same. These two bosses serve as limiting stops to prevent the rapid rotation of the pawl 86. The slide 92 is adapted to be actuated within certain limits along the upper end of the bar 60. As shown in Fig. 2, the slide occupies its extreme limit to the right. If, now, the slide be moved slightly to the left, the boss 90 will disengage the portion 89 of the pawl 86, and this pawl under tension of the cord 82, tends to rotate. It makes half a revolution and is stopped by the boss 91 engaging the portion 89. When, therefore, the slide 92 is moved back into its original position indicated in Fig. 2, the pawl 86 makes a second half revolution. Each complete revolution of the shaft 83 and thread 84 is therefore effected, or rather permitted, by a movement of the slide 92, first toward the left and next toward the right, according to Fig. 2. Lugs 93 are

mounted upon the portion 61 of the bar 60 and mounted upon these lugs is a pivot pin 94. A lever 95 is supported by this pivot pin and is provided with a portion 96 which extends obliquely upward through a portion 92^a to the slide 92. Whenever the lever 95 is caused to rock, the slide 92 reciprocates and thus allows the gradual rotation of the shaft 83. The pawl 86 and slide 92 with their accompanying parts thus constitute an escapement.

Record disks are shown at 97, 98, 99 and are supported by the different convolutions of the thread 84. The rod 75 extends through all of these disk records. Whenever the lever 95 gives one up stroke and one down stroke, the escapement is operated in such manner that the thread 84 forms one complete revolution and this releases the lowermost record disk which in this instance is the one marked 99. The record disk being released simply follows the rod 75 downwardly, and the upper portion of the shaft 72, and rests upon the turntable. The lever 95 is pivotally connected at its outer end with a rod 100, the latter being in turn pivotally connected with a sliding rod 101. This sliding rod is supported at its upper end by a slotted plate 102 connected rigidly with the upper frame 59 and supported thereby. The shaft 45 is provided with three cams 103, 104, 105. The cams 103 and 105 are so called "snail cams" (see 105, Fig. 6), while the cam 104 is what we designate as a "roller cam," it being provided with rollers 106, 107. The roller 107 is a little in advance of the roller 106 in the general direction of rotation. All of the cams are for the purpose of actuating different movable parts, as hereinafter described.

A sound box 108 (see Figs. 13, 14, 15) is provided with a needle holder 109, and a needle 110 is secured temporarily within the holder for the purpose of engaging the surface of the disk record. The needle holder is provided with a funnel-shaped opening 111 to facilitate the entrance of the blunt end of the needle. This opening 111 merges into a slot 112, as will be understood from Figs. 14, 15. A lever 113 is provided with a head 114 of the shape shown in Fig. 15, and this head is adapted to engage the blunt end of the needle 110 for the purpose of pushing the needle from the needle holder. The lever 113 is mounted upon a pivot 115 and is provided with a portion 116 extending outwardly from the pivot. When the portion 116 is moved upward according to the view shown in Fig. 15, the needle 110 is ejected. A guide plate 117 is mounted upon a portion 118 of the sound box and serves to temporarily secure the needle holder in a definite position, as hereinafter explained, for the purpose of facilitating the changing of the needle. A needle bar is shown at 119 and is

connected with the needle holder. The needle holder 109 is provided with a revoluble bolt 120 provided with a cross pitch thread 121, and further provided with a smooth cylindrical point 122. The latter engages the needle 110 for the purpose of holding it temporarily in position. A spring 123 is provided with portions 123^a, 123^b, whereby it is secured in position. This spring is wound spirally around the bolt 120 and normally holds it in such position that the point 122 presses against the needle 110 with sufficient firmness to hold it in position. Mounted upon the bolt 120 is a sleeve 124 into which extends a screw 125 engaging the bolt 120. This clamps the sleeve 124 and bolt 120 rigidly together. The sleeve 124 is provided with an arm 126 shaped substantially like a horn, as indicated in Fig. 13. The arm 126 normally engages a limiting stop 127 having the form of a spring hook. Whenever the arm 126 is raised, as indicated by dotted lines in Fig. 13, the bolt 120 (see Fig. 14) is turned, and the needle 110 is dropped. The ends 123^a, 123^b of the spiral spring 123 are secured respectively to the arm 126 and the needle bar 119, as will be understood from Fig. 13. A needle box 110^a for receiving the needles dropped one at a time after using, is mounted upon a bracket 110^b. For this purpose, a plate 110^c is connected with the needle box and is placed flatly against the bracket 110^b, and secured to the same by a screw 110^d. The plate 110^c is also bent slightly over the top of the bracket. By removing the screw 110^d, the needle box may be removed for the purpose of throwing out the needles.

A phonographic tube is shown at 128 and is pivoted at the point 138^a to the braces 129. The tube 128 is free to accommodate itself to different parts of the record, and also to allow the needle holder and its accompanying parts to be shifted for the purpose of changing the needle. The phonographic tube 128 engages a rest 130 and is connected by a flexible coupling 131 with the horn 132. The horn is supported at its larger end by a rest 133 (see Fig. 2) this rest being mounted rigidly upon a rod 134 which is bent at different angles upon itself, as at 135, Fig. 8, and pivoted in bearings 136. These bearings are integral with a plate 137 secured to the framework. By pushing the rest 133 back or forth, the horn 132 can be elevated or lowered within reasonable limits. It is for this purpose that we mount a portion of the rod 135 in bearings 136, as indicated in Fig. 8.

A post 138 is provided with outwardly extending portions 138^a, the post together with these parts being of a general Y-shape. The rest 130 is pivoted intermediate of the portions 138^a of the post. The top of the post 138 is provided with a pivot 139, and its bottom with another pivot 140 (see

Fig. 11). A bracket 141 engages the pivot 139 which extends through it, as indicated in Fig. 11. Similarly the pivot 140 extends downwardly into a rod 142 supported rigidly upon the framework. Connected securely with this rod 142 is another rod 143 bent into the shape indicated in Fig. 11. Mounted upon the upper end of this rod is a supporting sleeve 144 constituting a bearing for a small portion of the horn 132. A leaf spring 145 engages the horn 132 and is provided with a portion 146 secured to the rod 143. This portion 146 is bent upwardly at 147 so as to form ears for the purpose of holding the lower end of the spring 145 rigid in relation to the bar 143. A bolt 148 extends through the bar 143 and the spring 146. This bolt is encircled by a spiral spring 149. A nut 150 is threaded and fitted upon the lower end of the bolt 148, the latter being threaded likewise. By turning the nut 150 the spiral spring 149 is compressed or relaxed to a greater or lesser extent, as desired, thus affecting the degree of pressure exerted by the leaf spring 145, serving as a means for controlling the tension of this spring.

A rod 151 is connected rigidly with the post 138, the latter being provided with a lug 152 for the purpose of making the connection between the rod 151 and the post rigid. The rod 151 extends toward the center of the machine (see Fig. 8) and pivotally connected with it is a weight holder 153 of substantially U-shape. A weight 154 is rigidly secured upon this weight holder. This weight is provided with a roller 155 which rests upon a leaf 156 constituting a track therefor. This leaf inclines downwardly so that the weight 154 normally tends to draw the rod 151 toward the lower end of the leaf 156. The leaf 156 may be bent to different angles, as desired, so as to practically adjust the pull exerted by the weight 154. A bracket 157 is mounted rigidly upon the rod 151 and along the rod 151 is moved by the weight 154. A rocking shaft 158 is mounted in bearings 159, 160, these bearings being integral with slides 160^a (see Fig. 8). A portion 161 of the rocking shaft 158 is bent upwardly and forwardly and is located within the path of the bracket 157, so that when the bracket is moved by action of the weight 154 the rocking shaft 158 is turned a little distance. A portion 162 of the rocking shaft 158 extends beyond the bearing 160 and is bent outwardly. A rocking lever 163 is pivotally mounted upon a support 164, the latter being free to turn upon a pivot 165. The lever 163 is provided with a blade 166 of arcuate conformity. This blade normally occupies a position almost coinciding with a part of the path of a boss 167, which is mounted upon the under side of the turntable. The parts are so arranged and adjusted, however, that unless

the portion 162 of the rocking shaft 158 is in its uppermost position, the blade 166 is not quite within the path of the boss 167. Our idea is to have the blade 166 raised by action of the rocking shaft 158 into such position that the blade may be struck by the boss 167, owing to the revolution of the turntable. The support 164 is provided with a lug 168 which is adapted to enter the notch 48 of the cam 47. A counterweight 169, adjustable relatively to the lever 163, enables this lever to be so arranged that comparatively little effort exerted by the part 162 of the rocking shaft 158 will raise the blade 166 into the path of the boss 167; see Fig. 7.

A spring 170 is wound upon a lever 170^a, and this lever is integral with a shaft 170^b, which is journaled in bearings 170^c and free to rock. The lever 170^a, acted upon by the spring 170, normally holds the lug 168 in the notch 48 of the cam 47. In doing this the spiral spring tends to force the lever 163 into such position that the blade 166 will intersect the path of the boss 167, but until the cam 47 turns into such position that the lug 168 can enter the notch 48 the lever 163 must occupy the position indicated by dotted lines in Fig. 8. The instant, however, that the lever is free to move (owing to the fact that the lug 168 passes into the notch 48) it springs into the position indicated by full lines in Fig. 8. Even this does not quite enable the boss 167 to trip the lever, for the reason that the blade 166 is too far below the boss. When, however, the rocking shaft 158 is turned, the portion 162 raises the blade 166 directly into the path of the boss 167. The lever 163, it will be understood, has two motions: that is to say, it turns slightly in two planes intersecting each other (Fig. 8). The lever may be turned from the position indicated by dotted lines, to that indicated by full lines, and vice versa, and it may also be rocked so as to raise and lower the blade 166. When in its lowermost position it engages the rest 171. The cam 105 upon the shaft 45 is engaged by a roller 172, this roller being mounted upon a spring bar 173 which is provided with a shelf 174 (see lower right hand portion of Fig. 5). A spiral spring 175 is connected with the shelf 174 and pulls the same directly. A hook 176 formed at the lower end of a bar 177 loosely engages the under side of the spring bar 173 which is bent for this purpose, as will be understood from Fig. 4. The bar 177 is pivotally mounted upon links 178, 179, these links being journaled upon the upper frame 59. A spiral spring 180 is connected with this frame and with the bar 177. This spring tends to normally hold the bar 177 in its highest position, and thus cause it to press gently against the under side of the spring bar 173. The tension of the spring 180, however, is not sufficient to raise the spring bar 173. Mounted

upon the bar 177 is a spring finger 181 which extends to the left according to Fig. 4, so as to be approached quite closely by the lever 126. Mounted below the spring finger 181 is a spring rest 182 which is at times engaged by the spring finger 181. A bracket 183 is mounted rigidly upon the upper frame 59 and supports two guide plates 184, 185, which are for the purpose of guiding the sound box 108 when the latter is being moved into position to have the needle changed. Mounted upon the upper frame 59 and depending therefrom is a bracket 186. A rocking shaft 187 extends through this bracket and also directly through a part of the upper frame. This rocking shaft is provided with a portion 188 formed into a crank, as indicated in Fig. 4, and extending partially into the path of the sound box. The rocking shaft 187 is provided at its other end with a crank 189. Journaled upon this crank is a bar 190. A spring 191 is connected with this bar and also with the upper frame 59. A link 192 is pivotally connected with the upper frame and with the bar 190. The bar 190 terminates at its lower end in a hook 193 which extends out under a spring bar 194 provided with a shelf 195. A scout spring 196 is connected with this shelf and normally tends to pull the same downwardly. The spring 191 is considerably weaker than the spring 196 and merely holds the bar 190 up toward the spring bar 194. An adjusting screw 197 extends through the spring bar 194 and also through a thumb nut 198. By loosening the thumb nut the adjusting screw 197 may be raised or lowered and then tightened in position by tightening the thumb nut. In this manner the play of the hook 193, and consequently of the bar 190, may be regulated at will in such manner that the height to which the shelf 195 may be raised can be regulated at will. A roller 199 is mounted upon the spring bar 194 and engages the cam 103, which, as above described, is secured upon the revolvable shaft 45. Pivotaly mounted upon the shelf 195 and depending therefrom is a pawl 200 carrying at its lower end a weight 201. Brackets 202, 203 are mounted rigidly upon the upper frame 59, and secured to these brackets is a substantially Z-shaped bar 204. To the Z-shaped bar, ears 205 are rigidly secured, which partially enclose a slide 206. At the lower end of the Z-shaped bar 204 is a slot 204^a, through which and into the slide 206 extends a screw 207, see Fig. 20. A block 207 is mounted upon the lower end of this slide and spaced therefrom by a packing block 208. The pawl 200 bears partially within the path of the block 207, so that whenever the shelf 195 descends the pawl 200 engages the block 207 and pulls the slide 206 absolutely downwardly.

The upper end of the slide 206 carries a

head 209 provided with ears 210, 211. Journaled within these ears is a link 212 and mounted within this link is a slide 213 provided with shoes 214 which engage oppositely disposed portions of the link. The lower end of the slide 213 is provided with a plate 215 having a lug 216 integral therewith, this lug being bent slightly upward, according to the view shown in Fig. 4. A pin 217 is mounted rigidly upon this lug and extends obliquely upward through a spiral spring 218, and also through an ear 219 which is rigid upon the head 209. The fit of the pin 217 within the ear 219 is quite loose so that some little play of the pin within the ear is afforded.

A shaft 220 is journaled within the head 209 and is encircled by a spiral spring 221 (see Fig. 20,) which is secured thereto by a pin 221^a. The lower end of this shaft is provided with a shoulder 220^a and is journaled in a bracket 220^b. A lug 212^a mounted upon the link 212 (see Fig. 21) is adapted to engage the shoulder 220^a. The upper end of the shaft 220 is provided with a reduced threaded portion 222 upon which fits a nut 223. This shaft 220 extends through metal disks 224, 225, a rubber disk 226 and another metal disk 227 arranged as shown in Fig. 20. Holes 228 extend through the disks 226 and 227 and into the disk 225, which is coned out to receive the sharp end of the needle. Into the holes 228 are inserted a number of needles 110, spaced equidistant. As each needle is thus centered in the bottom of the hole in which it rests and is also centered by the rubber disk 226 because of the resiliency of the latter, the needle is held straight, but is not rigid while in the needle wheel. The disks 224, 225, 226 and 227 together constitute a member which we designate as the needle wheel. A stop pin 229 is mounted rigidly upon the needle wheel.

A needle chute 230 is provided with a plate 231 integral with it (see Fig. 21) and this plate is adjustably connected by a screw 232 and a nut 233 with the head 209. A washer 234 is disposed immediately below the needle wheel. A plate 235, adjustable by aid of a bolt 235^a and nut 235^b, is provided with an upwardly projecting portion 236 having a slot 237. This plate with its slot is for the purpose of guiding the sound box. For this purpose the plate 235 may at times be raised into such position that the plate 117 upon the sound box may be disposed within the slot, as will be understood from Fig. 4.

In order to facilitate the exchange of the needles from the needle wheel to the needle holder, they are brought in succession to the determinate point by aid of a V-shaped mutilation 238 (see Fig. 7) in the needle chute. The needle wheel can only turn to such an extent as will bring one of the needles into the bottom of this V-shaped mutilation, and when this needle is pulled out, the needle

wheel is free to turn slightly so as to bring the next successive needle into the same position.

Mounted upon one end of the shaft 45 is a crank 239. Journaled upon the other end of this crank is a pitman 240, the lower end of this pitman extending downwardly and being journaled upon a bracket 241 carried by a slide 242. This slide also carries another bracket 243 and extending through both of these brackets is a slide rod 244. This slide rod is slidably mounted near its lower end in a bearing 245. The upper end of the slide rod is connected rigidly with a plate 246 having a central slot 246^a and being slidably mounted in bearings 247. Mounted upon the upper end of the plate 246 is a bracket 248 extending horizontally therefrom. A horizontal arm 249 is mounted upon this bracket and is provided with a slot 250. Extending obliquely upward through this slot is a movable arm 251 which is mounted upon a pivot pin 252 secured rigidly upon the lower portion of the bracket 248. The arm 251 is free to swing within limits allowed by the slot 250. A plate 253 is mounted upon the horizontal arm 249 and is provided with a slot 254, and a screw 255 extends through this slot and into the horizontal arm 249. By aid of the screw 255 and slot 254 the plate 253 may be adjusted within reasonable limits upon the horizontal arm 249. The plate 253 is provided with a lug 256 integral therewith, and this lug is engaged by a pawl 257, which pawl is mounted upon a pivot pin 258 carried by the plate 253. A spring 259 is wound partially around the pin 258 and is secured rigidly thereto, this spring being also secured to the pawl 257, as will be understood from Fig. 9. The upward limit of movement of the pawl 257 is made by the lug 256. The pawl is thus free to swing downwardly upon the pivot pin 258 as a center, until the pawl reaches such position that its upper surface is flush with the upper surface of the arm 249. Mounted upon the slide rod 244 is a bracket 260 secured rigidly in position by a bolt 261, and by aid of this bolt the bracket 260 may be adjusted upon the rod 244. A pawl 262 is pivotally mounted upon the bracket 260 and is connected therewith by a spring 263 in such manner that the upper portion of the pawl 262 normally stands vertical. This pawl is mounted upon a pivot 264 and is provided with a lug 265. Disposed adjacent to the path of this lug is a slide 266 provided with a slot 267. An adjusting screw 268 extends through this slot and into the frame member 25. The lower end of the plate 266 is provided with a lug 269, this lug being directly in the path of the lug 265 of the pawl 262.

The rotation of the shaft 45 causes the crank 239 to turn, and the pitman 240 actuated by this crank causes the slide rod 244 to

reciprocate vertically. The slot 246^a in the plate 246 is not of sufficient length, however, to allow the rod 244 to perform a stroke of double the length of the crank 239; that is to say, the rod 244 and the plate 246 move upwardly until stopped by the engagement of the lower end of the slot 246^a against the shaft 45. At the instant when this takes place the lug 265 lodges against the lug 269 (see lower left-hand portion of Fig. 9), and the pawl 262 is tripped. This pawl in the lower portion of the stroke of the rod 244 engages a lug 241^a upon the plate 241. When, however, the pawl is tripped, as just stated (see Fig. 9), it disengages the lug 241^a, and the slide 242 being now free of the rod 244, simply continues its upward travel in consequence of motion given it by the crank 239.

The movement just described may be briefly summarized by saying that the slide 242 has the motion which would ordinarily be expected from the crank 239, and during a part of the stroke of this slide it carries with it the rod 244, dropping this rod at a definite point and picking it up again upon the down stroke of the rod 244. This picking up of the rod 244 by the downward movement of the slide 242, takes place because the instant the slide 242 reaches the bracket 260 and carries it downward, the portion 265 of the pawl 262 is released from the stationary bracket 269, and the pawl 262, under impulse of the spring 263, clicks again into its normal position, thus engaging the lug 241^a of the plate 241 and causing the slide 242 and the rod 244 to finish, as a unit, the down stroke given by the crank 239.

Disposed adjacent to the slide rod 244 and parallel therewith is another slide rod 270, the latter toward its bottom extending through a bearing 271 and being provided with a toe 272. A spiral spring 273 of the so-called "extension type" is connected with the toe 272 and is also secured to an ear 274 mounted upon the framework. The slide rod 270 is provided with a wide flat portion 270^a which enables it to be more easily guided. This slide rod 270 has a motion very much like that of the slide rod 244. It starts upward at the same instant as the slide rod 244 and when the latter is stopped as above described, the slide rod 270 is stopped at the same instant. Hence, the horizontal arm 249, which is supported partly by the plate 246 and partly by the slide rod 270, has an analogous motion. It moves upward at the same instant as the rod 244.

A pitman rod 100^a, which is pivotally connected with the slide 242, is provided with a sliding head 100^b, in which is mounted a spiral compression spring 100^c, the latter being always under more or less tension and being compressed whenever the swinging arm 251 is in its extreme position at the left,

according to Fig. 9, so as to firmly hold the phonographic tube 128 while the sound box receives a needle. The upper end of the sliding head 100^b is pivoted at its upper end to the arm 251. Since the slide 242 has a movement equal to double the length of the crank 239, it follows that the rod 244 and the arm 251 actuated by it do not stop in their movements except at the limits of the stroke of the crank. The net result is that when the horizontal arm 249 is in its lowermost position, the arm 251 occupies its farthest position to the right, according to Fig. 3. The horizontal arm 249 and the arm 251 start upwardly together, still occupying the same relative position. The arm 249 comes to a stop; yet the arm 251 does not stop but continues its upward motion now swinging upon the pivot pin 252 as a center, ultimately reaching its extreme position to the left, as indicated in Fig. 9. This operation also brings the sound box from the center of the record into a position favorable for setting the needle. Furthermore, the action just described causes the needle to move into suitable position to engage the record at the starting point thereof. This movement is repeated with every revolution of the shaft 45.

The crank 239 carries a pin 275 extending inwardly toward the framework, as indicated at the left of Fig. 5. This pin is in close proximity to a star wheel 276 which is mounted upon a stub shaft 277. This star wheel is provided with pawls 278 mounted one upon every second tooth by aid of a screw 279^a, as indicated in Fig. 9. Partially obstructing the path of each pawl 278 is a lever 279 mounted in brackets 280. The lever 279 is integral with a shaft 281, the other end of this shaft being provided with a crank 282 integral with it. Each time the lever 279 is thrown outward the crank 282 rises and moves slightly outward from the center of the machine.

A bracket 283 (see lower right-hand corner of Fig. 4) is adjustably mounted, and for this purpose a screw 284 passes directly through it. By loosening the screw 284 and moving the bracket endwise, as indicated by full and dotted lines in Fig. 4, the arm 279 may be moved into or out of the path of the several pawls 278. The purpose of this arrangement is to enable the operator, by adjusting the bracket 283, to enable the stop-by-step rotation of the star wheel 276 to stop the action of certain parts, as hereinafter described. The rotation of the star wheel is accomplished step by step. Each time the shaft 45 makes a complete revolution, the star wheel is turned one step.

Reference now to Fig. 8, lower central portion, a bracket 285, of substantially U-shape, is mounted rigidly upon the upper frame 59 and supports a pin 286 extending

directly through it. Journalled upon this pin by means of bearings 287, 288 are two levers 289, 290, which are engaged respectively by the rollers 107, 106 carried by the roller cam 104. Each time the shaft 45 turns, these two levers are lifted upward, the movement of the lever 289 being slightly earlier than that of the lever 290. Each time the shaft 45 makes a revolution, therefore, a roller 291, carried by the lever 290, being normally in contact with the plate 215 of the slide 213 (see lower middle portion of Fig. 4), and being raised by the under side of the roller 106 against the under side of the lever 290, causes the slide 213 to move obliquely upward according to the view shown in Fig. 4. As the spring 218 will resist considerable pressure before being compressed to any great extent, the slide 206 is raised obliquely upward, carrying ahead of it the needle wheel. The latter stops in such position that one of the needles is inserted directly into the needle holder which at this step is always empty. The lever 289 engages the under side of a portion 293 of a link 292, thus raising this link. In the meantime the cam 105 raises the shelf 174 so that the portion of the link underneath this shelf is entirely clear of the same for the moment. As the shelf 174 is raised by the action of the cam 105 against the roller 172, the rod 177 moves upward in consequence of the constant pull of the spring 180 upon it. The shelf 174 reaches approximately its highest position before the lever 289 begins to rise, as will be understood from Fig. 4. The shelf pauses for a moment in its highest position and is overtaken by the horizontal portion 294 of the link 292 which rises into engagement with it. For convenience the link is provided with the double portion 293 of sufficient breadth to constitute a broad bearing for the lever 289. The shelf, being released by the rotation of the cam, is drawn abruptly downward by the tension of the spring 175 and carries with it the link 292 and all parts immediately dependent upon this link for their motion. The slide rod 101 being connected with this link is thus given a reciprocating vertical motion which, like the rotation of the shaft 45, is by no means constant. Connected with the link 292 is a spiral spring 292^a which retracts it into normal position whenever it is otherwise free.

The lower end of the slide rod 101 is integral with a plate 296 provided with a slot 297, as shown in Fig. 10. The slide rod 101 is slidably connected to bracket 110^b. For this purpose a bolt extends through the slot 297 and into bracket 110^b. Said bracket is rigidly mounted upon a frame 59 and holds the needle box 110^c integral with a plate 110^d by a screw 110^e (see Fig. 4). The plate 296 is further provided with an extension 295 bent substantially into U-shape as indicated

in Fig. 10. A lever 299 is mounted upon the rod 101 by aid of a pivot pin 300. The plate 296 is provided with a lug 301 which normally engages the upper surface of the lever 299 and thus constitutes a limiting stop for the lever. Mounted upon the plate 296 is a guide plate 302 inclined slightly as indicated in Fig. 10, and having a portion 303 secured to the rod 101. A spiral spring 298 connects together the lever 304 and the U-shaped lower end of the slide rod 101, for the purpose of normally holding the lever 304 at one limit of its movement, indicated in Fig. 6. A substantially U-shaped lever 305 is journalled within the bearing 306. A portion 307 of this lever extends upwardly from the bearing and engages the slide 213 at the inner side thereof so that whenever the lever 305 is moved outwardly, the slide 213 and its immediate mountings likewise swing outwardly, being journalled in the brackets 210 as above described, for this purpose (see lower central portion of Fig. 4).

By adjusting the bracket 283 (see lower right-hand portions of Fig. 4) as indicated by dotted lines, and the lever 279 being moved into the path of the pawls 278, it follows that each partial revolution of the star wheel 276 in causing one of the pawls to move the lever 279 outwardly, must necessarily cause the crank 282 carried by the shaft 281 to engage the inner surface of the U-shaped lever 305 so as to throw this lever outwardly. In doing this the slide 213 and link 212 swing outwardly as described, so that when the roller 291 rises, as above described, the slide 213 is not lifted and consequently the needle wheel is not moved upward. It follows, therefore, that the operator, by merely adjusting the bracket 283, causes the needle wheel to be periodically moved upward or to remain stationary, as desired. At the instant when the slide 213 is pulled outward, the link 292 is likewise pulled outward; this is done by the U-shaped rod 305. Hence, the upward movement of the plunger rod 101, with its dependent parts, is prevented. As a consequence, the needle is not ejected, and no record now drops upon the turntable. The needle wheel, the needle ejector and the record-dropping apparatus are disengaged for the time being from control of the shaft 45. The result is that each record is played twice in succession with one needle before the next successive record is allowed to drop upon the turntable. This will be easily understood by bearing in mind the action of the pawls 278, located one each upon every second tooth of the star wheel 276.

A spacing sleeve 307^a encircles the bolt 277 of the star wheel 276 (see lower right-hand portion of Fig. 24). A bracket 308 partially supports this sleeve and also supports one end of the bolt 277. Spring washers 309 and a nut 310 are used for the pur-

pose of loosening and tightening the star wheel 276 in order to render it easy to turn, and yet prevent it from turning too easily. A guide rod 311 (see upper portion of Fig. 3) is secured upon the framework and is used to guide the phonographic tube 128 into proper position to enable the needle to start on the record. The guide rod 311 is secured upon the framework by a clamping bracket 311^a, secured in position by aid of a screw 311^b.

In Fig. 24 the upper frame is shown at 312 and is substantially U-shaped, being provided at its top with a plate 313. A bracket 314 of substantially U-shape is mounted centrally within the upper frame, and a stub shaft 315 is supported by this bracket. Mounted rigidly upon this stub shaft is a lever 317. A roller 318 is mounted upon a cam 316, the latter being secured rigidly upon the shaft 45. This cam takes the place of the cam 104 shown in most of the other figures, for instance Fig. 7. The lever 317 is partly cut away, as indicated in Fig. 24, and is tripped one time for each revolution of the cam 316 and shaft 45. Mounted upon one side of the upper frame 312 is a bracket 319 which supports a guide rod 320. This guide rod is for the purpose of guiding the phonographic tube 128 into the position indicated in Fig. 4. The slide rod 321 extends through a guide plate 322, the latter being rigid upon the plate 313. The lower portion of the rod 321 is bent into the form of a hook 323 and supported upon the rod 321 is the link 292 having the form and office above described. A bracket 324 forms a slidable support for the lower end of the rod 321. A pin 325 extends through the lower end of the rod 321, which is slotted for the purpose, into the bracket 324. It will be noted that the form shown in Fig. 24, has no needle wheel. It is made, therefore, for so-called permanent needles only, or at least is intended to be so used that one needle is employed for playing a number of records. The phonographic tube 128 moves upward from the turntable as in the other form of machine above described, but in the form shown in Fig. 24 this is merely for the purpose of allowing the record to be changed. In all other respects the action of the mechanism shown in Fig. 24 is the same as that shown in the other figures.

The operation of the mechanism shown in Figs. 1 to 23 inclusive, is as follows: We will suppose that the rod 75 has been removed and that no records are in the machine. The operator lays a disk record upon the turntable 70. He next swings the bracket 65 (see Fig. 2) outwardly, which is easily done, the bracket being pivoted upon the pin 67. The operator next adjusts the bracket 62 according to the size of record to be played. He next places the edge of a record disk 97 upon the brackets 62 and 65, and inserts the opposite edge of this disk

into the lowermost thread made by the spiral spring 84. Then, by turning the hand crank 85 this record is carried upward a single turn by the thread. The operator now inserts a second record below the first, supporting one of its edges upon the brackets 62 and 65 and lodging its opposite edge against the lowermost turn of the spiral wire 84. He next turns the hand crank 85 another single turn, and this secures the record disk in position. If the record disks are small, they may be adjusted as follows: The record holder bar 60, carrying its dependent parts, is placed about an inch back on the brace 58, at hole 60^c, and on the frame 59 at the hole 60^d. Bracket 62 is now replaced at the hole 60^a. The small records are now loaded into the machine, in the same manner as larger ones. A record guide rod, bent somewhat differently on top than the guide rod 75, is inserted at the hole 60^b and upon boss 74. The guide rod 311 must also be adjusted to guide the phonographic tube 128 and the sound box farther upon the turntable so as to enable the sound box and needle to start on the small record. The plate 253 must also be adjusted on the horizontal arm 249, so as to accommodate itself to this arrangement. The record magazine may also be loaded as follows: Wind up the spring barrel 81 as above described, slide the edge of the first record disk on brackets 62 and 65 and slide the opposite edge of the record disk into the lowermost thread of the spiral 84. Now slide the second record disk upon the first record, and into the second thread of the spiral. Next follows the third record disk in the third thread, and so on until there are as many record disks in the magazine as there are threads in the spiral 84. By so loading, each record is slid in place from one side, and the guide rod 75 is inserted through the centers of the records and on the boss 74 of the turntable shaft. A number of disks, commensurate with the number of turns of the spiral wire 84, are thus inserted, each disk representing one complete revolution of the hand crank 85. As the hand crank is thus turned in inserting the record disks, the spring barrel 81 is gradually wound up, being completely wound when the maximum number of record disks are inserted. The operator next takes the rod 75 and inserts it as indicated in Fig. 2, bringing the lower end 76 into proper registry with the boss 74 and causing the upper end 77 of the rod to click into the spring clip 78. The bracket 65 is now swung back into the position indicated in Fig. 2. The several disk records are now housed in the upper part of the machine which we designate as the magazine. The operator next fills the needle wheel with needles, inserting them one at a time, as will be understood from

Figs. 7 and 20. To do this he first turns the wheel in a contra clockwise direction, according to Fig. 7, until the boss 229 engages the edge of the needle chute 230. The spiral spring 221 being always under tension, tends to turn the needle wheel backward or in a clockwise direction, according to Fig. 7. Holding the wheel under tension, the operator, by hand, places in it all of the needles 110 which it is capable of holding, one of these needles, of course, extending through the mutilation 238 and preventing, for the moment, any rotation of the needle wheel. The operator next grasps the hand crank 30 and by its aid turns the shaft 29, so as to wind the spring 42. Motion is thus transmitted through the gearing to the shaft 45 and the latter tends always to turn, but is normally restrained.

It will be understood that the motion of the turntable carrying one or more disks is entirely independent of any of the spring mechanism or gearing above described. The turntable is actuated from the pulley 73 (see Fig. 2) and turns constantly, its rotation being independent of any spring mechanism elsewhere described.

In order to start the machine in the first instance, the operator may raise the blade 166 by depressing the opposite end of the lever 163. This brings the blade 166 into the path of the boss 167 carried upon the lower face of the turntable, and as the turntable is rotating, the boss 167 moves the blade 166 in a clockwise direction, as indicated in Fig. 8. This causes the pawl 168 to be withdrawn from the cam 47 and allows the shaft 45 to make one revolution upon the impulse of the gearing. The shaft 45 usually makes but one turn, being stopped by the pawl 168 clicking into the notch 48 of the cam 47. This single turn of the shaft 45, however, represents the complete cycle of operations as above described. The cam 103 upon the shaft 45 lifts the shelf 195 and allows the rod 190, under impulse of the spring 191, to move upward. In doing this the shaft 187 is rocked, and the crank 188, being now restrained by nothing but the spring 191, is free to swing from its normal position. This is to allow the sound box 108 to be brought into a position favorable for discharging the old needle and receiving a new one. The cam 105 in turning lifts the shelf 174 and raises the spring 180. This raises the spring arm 181 in order to make room for the entrance below it of the lever 126, as will be understood from Fig. 4. The cam 104 being rotated causes the roller 107 to lift the lever 289. This raises the link 292 and the rod 101. In doing this the lever 299 (see Fig. 10) is brought into engagement with the portion 116 of the lever 113, (see Fig. 15) and this causes the ejection of the needle 110, which rolls down the

needle chute and into the needle box 110^a. The same upward movement of the rod 101 causes the guide plate 302 to engage the under side of the lever 126, moving it into the position indicated by dotted lines in Fig. 13. This unscrews the needle 110 and thus loosens it at practically the same instant that the ejector lever 116 is thrown into action. The needle already in the needle holder is thus loosened and thrown out.

The fact that the roller 107 is slightly in advance of the roller 106 (see Fig. 4) causes the action of the roller 106 upon the lever 290 and roller 291 to be retarded slightly. The act of ejecting the old needle from the needle holder is complete before the roller 291 rises. As the roller 291 rises, the slide 213 moves obliquely upward to the right, according to Fig. 4, and the needle wheel moves in the same direction. The first needle 110 of the series contained in the needle wheel is now in exact alinement with the needle holder, which is now empty and open, as just described. The oblique movement of the needle wheel upward to the right, forces the stub end of the needle into the needle holder. The instant the needle holder thus receives the stub of a new needle, the rod 101 descends suddenly, owing ultimately to the action of the cam 105 releasing the shelf 174. This causes the spring arm 181 to turn, and this action secures a new needle firmly in position. The release of the shelf 195 from the cam 103 allows the shelf to drop abruptly, and as the latter does so, being forced downward by the spring 196, it pulls the rod 190 downward, thus rocking the shaft 187 and causing the crank 188 to eject the sound box from the position it has momentarily occupied while receiving this new needle. The sound box being thus ejected, its weight together with that of the tube 128 causes the tube to slide obliquely downward, being guided by the rod 311. At the same instant the horizontal bar 249 descends owing ultimately to the action of the crank 239, as elsewhere described. The swinging arm 251 is now relaxed and as the horizontal rod 249 descends, the phonographic tube 128 is carried gently downward in an oblique direction and landed near the outer edge of the record disk resting upon the turntable. As this disk is constantly rotating, the instant it is engaged by the new needle, the phonographic sounds are reproduced. The sound box and phonographic tube connected with it are gradually carried toward the center of the disk, this action being due to the thread-like conformity of the record groove. When the sound box thus moves obliquely downward, the needle engages the record disk near the outer edge of the same, the part of the disk thus engaged being smooth. The weight 154 now tends to so move the sound box and

parts connected with it as to lead the needle point into the beginning of the sound groove. The weight 154 does not pull so hard, however, as to cause the needle to skip out of the sound groove. As the leaf 156 may be inclined (by bending) to any desired extent, the degree of its pull may be regulated at will so that any tendency of the needle to behave improperly may be corrected. The record being completed, the sound box occupies such position that the needle now rests upon the central smooth portion of the record. In this position, however, (the sound box being comparatively near the center of the record) the weight 154 (see Fig. 8) is pulling the tube 128 pretty strongly, tending all the while to move it further toward the position indicated by dotted lines in this figure. Hence, the bracket 157 engages the portion 161 of the rocking shaft 158 and turns this shaft slightly. The other end 162 of this shaft is thus raised against the under side of the blade 166, raising this blade into the path of the boss 167. The lever 163 is thus turned slightly, as indicated by dotted lines in Fig. 8, and the pawl 168 is thus released from the cam 47, allowing the shaft 45 and its accompanying parts to make a second revolution. During the operation just described, it will be noted that the rod 101 has moved first upward and then downward. In doing this it necessarily raises and lowers the rod 100 and this causes the slide 92 to reciprocate a complete cycle. This according to Fig. 18, means that the slide 92 moves first obliquely downward to the left and then obliquely upward to the right, stopping where it started. In doing this the tooth 91 is disengaged from the pawl 89 and the latter turns half a revolution, being stopped by the tooth 90, and this too is next disengaged, allowing the pawl 86 to perform a second half revolution. Hence the spring 84, which, as above explained, is virtually a thread, lowers each and all of the record disks it contains by a distance representing one thread, the lowermost of the disks being discharged. It glides obliquely downward, covering the disk already upon the turntable. This movement takes place at the instant when the sound box is out of the way; or in other words, while the needle is being changed. The operation of the device is thus continuous and automatic.

When the operator desires to reproduce each record twice, he does so by simply adjusting the bracket 283 (see lower right-hand portion of Fig. 4) as above described. Again, if the operator desires to repeat each record a number of times, he can simply disconnect the rod 100 from the rod 101 and in this event the mechanism containing the disk records now in use, remains unchanged until the rod is connected again.

In using the form of upper frame shown in Fig. 24, each record may be reproduced twice before the next succeeding record drops upon the turntable. In this form of the machine there is no needle wheel, for the reason that the needles are changed by hand as often as desired.

Having thus described our invention, we claim as new and desire to secure by Letters Patent:

1. The combination of a frame, a bracket mounted thereupon and adapted to engage record disks, a turntable disposed adjacent to said frame and adapted to receive said record disks one at a time, a revoluble member provided with a thread mounted upon said frame and disposed opposite said bracket, and means for guiding said record disks to said turntable when disengaged from said thread.

2. The combination of a turntable, a frame mounted thereover, a revoluble member mounted upon said frame and provided with a thread for disengaging the edges of record disks, spring mechanism for turning said revoluble member, and an escapement for periodically stopping said revoluble member.

3. The combination of a needle holder, ejecting mechanism connected therewith for ejecting a needle which has been used, a needle wheel disposed adjacent to said ejector and adapted to contain a number of new needles, means for moving said needle wheel toward said needle holder, and means for tightening a needle when removed from said needle wheel to said needle holder.

4. The combination of a revoluble shaft, gearing for turning the same, a cam mounted upon said shaft, a needle wheel disposed adjacent to said shaft, connections from said cam to said needle wheel for moving said needle wheel bodily whenever said shaft is rotated, a sound box provided with a needle holder, mechanism for moving said sound box so that said needle holder occupies a predetermined position relatively to the general position of said needle wheel, and means for clamping said needle within said needle holder when received from said needle wheel.

5. The combination of a plurality of sound records, means for actuating the same, a needle holder, means for changing the needle in said needle holder, and means controllable by hand for enabling each record to be reproduced a plurality of times before said needle is thus changed.

6. The combination of a revoluble member for supporting a sound record, a magazine for holding a plurality of sound records to be fed one at a time to said revoluble member, means for disengaging said sound records one at a time, and mechanism controllable at will for gaging the sizes of records to be accommodated by said magazine

7. The combination of a revoluble member for supporting a sound record, a magazine for holding a plurality of sound records, means for feeding said sound records one at a time
5 from said magazine, means adjustable at will for enabling any record to be played twice in succession before another record is fed from said magazine, a needle holder, and mechanism for automatically substituting
10 a new needle in said needle holder after each record is played twice in succession.

8. The combination of a revoluble member for supporting a sound record, a magazine for holding a plurality of sound records,
15 means for feeding said sound records one at a time from said magazine, means adjustable at will for enabling each record to be played twice in succession before another record is fed from said magazine, a needle holder, and
20 means for securing a single needle therein for the purpose of playing a number of records therewith twice in succession.

9. The combination of a revoluble member for supporting a sound record, a magazine for holding a plurality of sound records,
25 means for feeding said sound records one at a time from said magazine, mechanism for causing each record to be played twice in succession before another record is fed from said
30 magazine, a needle holder, and means for shifting said needle holder from one record to another after playing the record twice.

10. The combination of a revoluble member for supporting a sound record, a magazine for holding a plurality of sound records,
35 means for playing said sound records, and mechanism for feeding said sound records one at a time from said magazine, each record being fed after the preceding record has been
40 played twice only in succession.

11. The combination of a revoluble member for supporting a sound record, a magazine for holding a plurality of sound records,
45 means for feeding said sound records one at a time from said magazine, a needle holder, means adjustable at will for enabling any record to be repeated as many times as desired, and automatic mechanism for substituting a needle after each time a record is
50 played.

12. The combination of a revoluble member for supporting a sound record, a magazine for holding a plurality of sound records,
55 means for feeding said sound records one at a time from said magazine, a needle holder for engaging said sound records, and means controllable at will for adjusting said magazine to accommodate large or small records as desired.

13. The combination of a turn-table for holding a record, means for actuating said turn-table, a magazine disposed adjacent to said turntable and adapted to hold a supply of records, a rod disposed centrally of said

magazine and extending through the records
65 stored therein, said rod extending toward the center of said turntable for the purpose of guiding said records while traveling from said magazine toward said turntable, and means for disengaging said records from
70 said magazine.

14. The combination of a turntable adapted to support a record while the latter is being played, a magazine for holding records to be deposited upon said turntable, said
75 magazine including a rod for extending through said records in order to guide the same relatively to said turntable, mechanism for engaging the edges of said records while supporting the same independently of said
80 turntable, and co-acting with said turntable for disengaging said member from said edges in order to permit said records to drop upon said turntable.

15. The combination of a needle holder, 85 ejecting mechanism connected therewith for ejecting a needle which has been used, a needle wheel disposed adjacent to said ejector and adapted to contain a number of new needles, means for moving said needle
90 wheel toward and from said needle holder, means for tightening a needle when removed from said needle wheel to said needle holder, a revoluble member for supporting a record, and means co-acting with the movements of
95 said needle wheel for periodically supplying records to said revoluble member.

16. The combination of a revoluble member for supporting sound records, a magazine for holding a plurality of sound records,
100 means for feeding said sound records from said magazine, and mechanism controllable at will for enabling any record to be played a predetermined number of times in succession before another record is fed from said
105 magazine.

17. The combination of a revoluble member for supporting a sound record, a magazine for holding a plurality of sound records,
110 means for feeding said sound records one at a time from said magazine, mechanism adjustable at will for enabling each record to be played a predetermined number of times only before another record is fed from said magazine.
115

18. The combination of a revoluble member for supporting a sound record, a magazine for holding a plurality of sound records,
120 means for feeding said sound records from said magazine, mechanism adjustable at will for enabling each record to be played a predetermined number of times in succession before another record is fed from said magazine, a needle holder, and means for securing a single needle therein for the purpose of
125 playing each record its predetermined number of times.

19. The combination of a revoluble mem-

ber for supporting a sound record, a magazine
for holding a plurality of sound records, means
for feeding said sound records, one at a time,
from said magazine, mechanism adjustable
5 at will for automatically causing each record
to be played a predetermined number of
times in succession before another record is
fed from said magazine, a needle holder, and
means for shifting said needle holder from
10 one record to another after playing the
record said predetermined number of times
in succession.

20. The combination of a revoluble mem-
ber for supporting a sound record, a maga-
15 zine for holding a plurality of sound records,
means for playing said sound records, and
mechanism for feeding said sound records,
one at a time, from said magazine, each
record being fed after the preceding record

has played a predetermined number of 10
times only in succession.

21. The combination of a revoluble mem-
ber for supporting a sound record, a maga-
zine for holding a plurality of sound records,
means for feeding said sound records, one 25
at a time, from said magazine, and means
controllable at will for adjusting said maga-
zine to accommodate large or small records
as desired.

In testimony whereof we have signed our 30
names to this specification in the presence of
two subscribing witnesses.

CHARLES E. KRUEGER.

WILLIAM H. KRUEGER.

Witnesses:

WM. HOSCHIED,

O. O. ALLEN.



F. M. MURPHY.
 PHONOGRAPH HORN.
 APPLICATION FILED OCT. 2, 1908.

915,874.

Patented Mar. 23, 1909.

Fig. 8.

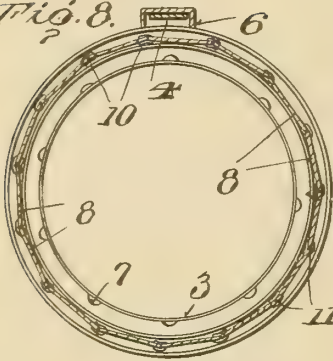


Fig. 1.

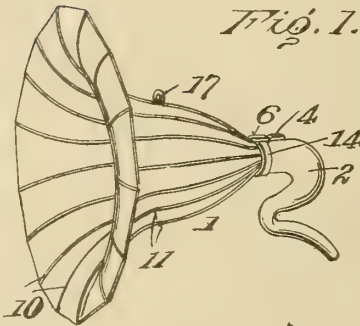


Fig. 10.



Fig. 2.

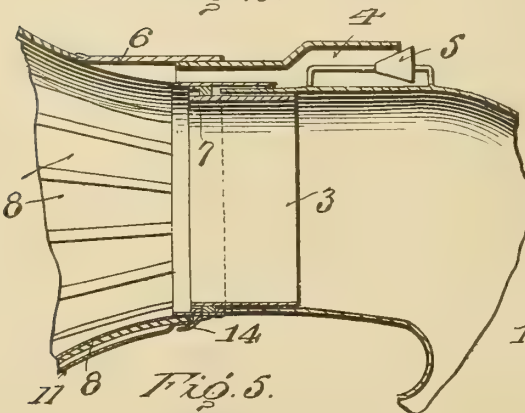


Fig. 3.

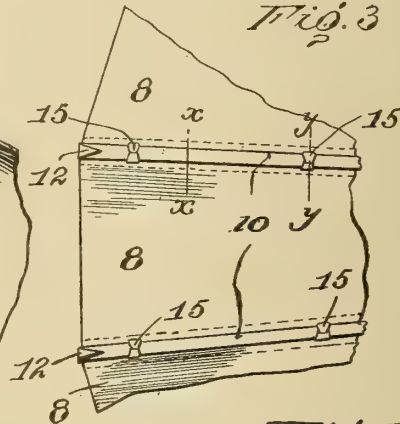
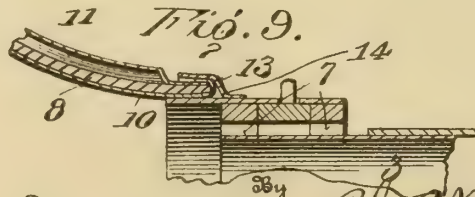
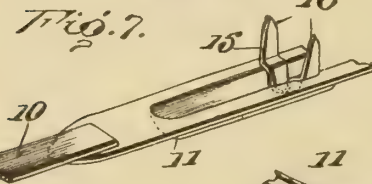
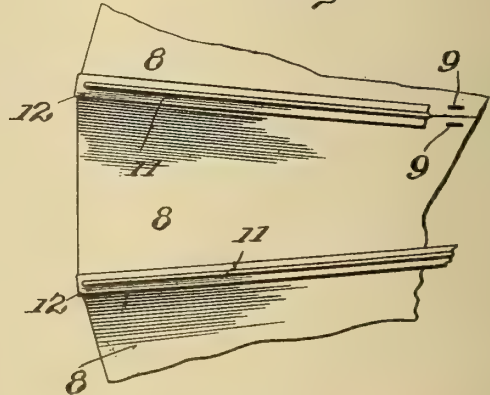


Fig. 5.



Fig. 4.



Witnesses
[Signature]
 L. H. Johnston

Inventor
 F. M. Murphy

By *[Signature]* Attorney

UNITED STATES PATENT OFFICE.

FRANCIS M. MURPHY, OF JERSEY CITY, NEW JERSEY.

PHONOGRAPH-HORN.

No. 915,874.

Specification of Letters Patent.

Patented March 23, 1909.

Application filed October 2, 1908. Serial No. 455,899.

To all whom it may concern:

Be it known that I, FRANCIS M. MURPHY, citizen of the United States, residing at Jersey City, in the county of Hudson and State of New Jersey, have invented certain new and useful Improvements in Phonograph-Horns, of which the following is a specification.

The present invention has for its object to provide an improved form of horn of the sectional type, designed most especially for sound reproducing machines, such as phonographs, although adapted for use where sound is to be amplified.

The invention relates to the means for connecting the sections of the horn, whereby close, firm, substantial and neat joints result, and which joints strengthen, brace and stiffen the horn in the direction of its length, while at the same time admitting of the structure being light and cheap.

For a full understanding of the invention and the merits thereof and also to acquire a knowledge of the details of construction and the means for effecting the result, reference is to be had to the following description and accompanying drawings.

While the invention may be adapted to different forms and conditions by changes in the structure and minor details without departing from the spirit or essential features thereof, still the preferred embodiment is shown in the accompanying drawings, in which:

Figure 1 is a perspective view of a horn embodying the invention and comprising a body portion and a base; Fig. 2 is a longitudinal section of the upper portions of the coupling end portions of the body and base, showing the parts on a larger scale. Fig. 3 is a view of the inner side of the joint formed between adjacent sections; Fig. 4 is a view of the parts illustrated in Fig. 3, as seen from the outer side; Fig. 5 is a section on the line $x-x$ of Fig. 3; Fig. 6 is a section on the line $y-y$ of Fig. 3; Fig. 7 is a perspective view of the outer end of an outer rib; and Fig. 8 is a transverse section of a part of the inner end of the body, showing the same on a larger scale. Fig. 9 is a sectional view of a portion of the horn and base showing more clearly the connection between the two and the ring provided with the valve controlled openings. Fig. 10 is a sectional view of a portion of the horn showing more clearly the manner of connecting the suspending loop thereto.

Corresponding and like parts are referred to in the following description and indicated in all the views of the drawings by the same reference characters.

As indicated most clearly in Fig. 1, the horn comprises a body portion 1 and a base 2, said parts being separable. The body of the horn is provided at its smaller end with a collar 3 to which the base 2 is fitted by a slip joint. The base is provided with an air chamber 4 controlled by means of a valve 5 for moderating the sound, the construction being substantially the same as set forth in Patent No. 880,388, granted to me February 25, 1908. The contracted end of the air chamber 4 communicates with the smaller end of the body 1, the latter having an opening in its upper side and said opening being covered by a hood 6 into which the end of the air chamber 4 extends. The collar 3 is provided with a series of valve controlled openings 7 which admit of softening harsh and unnatural tones.

The body of the horn is composed of sections 8 of pressboard, metal or other suitable sheet material, said sections being of a width, length and outline according to the size, design and finish of the horn when completed. The several sections are arranged with their longitudinal edges abutting and are connected by means which result in a substantial, neat and durable joint. Slits or openings 9 are provided at intervals along the edge portions of the sections 8 to receive the fastening means. Ribs or binding strips are placed upon opposite sides of the joints formed between the several sections, and these ribs are deflected between their longitudinal edges to stiffen the same and to enable the edge portions to fit close against the parts of the sections clamped between them. The ribs or binding strips conform longitudinally to a longitudinal element or section of the horn. The inner rib or strip 10 is approximately of **V** form in transverse section to correspond with the obtuse angle formed between adjacent sections. The outer rib or section 11 in addition to having its edge portions deflected to conform to the angle formed between the outer faces of adjacent sections has its middle portion pressed outward in a substantially **U** form in cross section, thereby providing a neat finish, as also supplying a rib having staying and stiffening qualities. The outer end of the rib 11 is flat and is bent around the edge of

the horn and over the outer end of the rib 10, as indicated at 12, and is soldered thereto. The inner end of the rib 10 is bent over the inner end of the rib 11, as indicated at 13.

5 The inner end of the rib 11 is flat to enable the confining ring or band 14 fitting close against the contracted end of the horn. Prongs 15 project from the rib 11 and pass through the slits or openings 9 and are bent around the rib or strip 10, thereby securing the inner and the outer ribs or strips to the end portions of adjacent sections clamped between them. The prongs 15 may be provided in any manner and consist of legs or 15 members of clips or staples 16 soldered or otherwise attached to the rib 11, preferably to the inner side of said rib so as not to interfere with or obstruct the appearance of the rib 11. After the several sections have been 20 connected to complete the horn, the ring or band 14 is fitted to the contracted end of the horn and soldered or otherwise attached to the inner ends of the ribs. A portion of the ring or band 14 projects beyond the contracted end of the horn so as to fit about the collar 3, to which it is soldered or otherwise 25 firmly attached. The ring 14 simply provides a finish between the collar 3 and the inner end of the sections 8 and the ribs at the small end of the horn. 30

The suspending loop 17 generally provided in connection with phonograph horns has its end portions passed through a section of the horn adjacent to contiguous ribs and the 35 inner end portions of the loop are soldered or otherwise attached to the inner ribs, thereby providing a substantial connection between said loop and the body of the horn. The hood 6 closing the opening by means of which the air chamber 4 has connection with the inner end of the horn, is substantially of U-form in transverse section and its edge portions are soldered or otherwise secured to the inner ends of adjacent ribs. 40

45 In the event of the sections of the horn consisting of light pressboard or similar thin sheet material, the ribs in addition to connecting the sections, provide substantial staying means for stiffening and bracing the horn and maintaining the shape thereof. 50 The rib sections 10 and 11 are formed of strips of metal cut into the required length and deflected between their longitudinal edges into the required shape substantially as herein specified. 55

Having thus described the invention, what is claimed as new is:

1. A horn of the character specified, comprising a body and a base, the two being 60 separable and adapted to make connection by means of a slip joint, the body of the horn having a hooded opening near its inner end and the base having a valve controlled air

chamber to make connection with the hood applied to the horn body.

65

2. A horn of the character specified, provided at its contracted end with a series of valve controlled openings encircling the same.

3. A horn composed of sections, means for connecting said sections, consisting of 70 strips arranged upon opposite sides of the joint formed between adjacent sections, one of said strips having prongs extended therefrom and passed through the sections and bent about the opposite strip. 75

4. A horn, comprising sections, strips placed upon opposite sides of the joints formed between the sections, and clips attached to the outer strips and passed through the sections of the horn and bent about the 80 opposing inner strips.

5. A horn of the character described, composed of sections, inner and outer strips arranged opposite the joints formed between the several sections, said strips being de- 85 flected between their longitudinal edges to conform to the angle formed between adjacent sections, and prongs extended from one of the strips and passed through the sections and bent about the opposite strips. 90

6. A horn of the character specified, composed of sections, inner and outer strips arranged opposite the joints formed between the several sections, the outer strips being 95 deflected between their longitudinal edges and having their middle portions pressed outward into an approximately U-form in cross section, and prongs extended from the outer strips and passed through the sections and bent about the inner strips to secure 100 the several strips and sections together.

7. A horn of the character described, comprising a series of sections, strips placed upon opposite sides of the joints formed between the several sections and having the opposite 105 end extended and bent over the ends of the sections and strips, and prongs projected from one of the strips and passed through the sections of the horn and bent about the other strip. 110

8. A horn of the character specified comprising sections, strips connecting the several sections and forming stiffening ribs, a collar at the small end of the horn having said strips attached thereto, and a band fitted 115 to the small end of the horn and the collar and over-lapping the joint formed between the inner ends of the sections and strips and the collar and secured to the inner ends of the said strips and to the collar. 120

In testimony whereof I affix my signature in presence of two witnesses.

FRANCIS M. MURPHY [L. S.]

Witnesses:

WILLIAM J. HOHAKI,
CHARLES H. HARDING.



G. K. CHENEY.
 REPRODUCING STYLUS FOR TALKING MACHINES.
 APPLICATION FILED JUNE 6, 1903.

915,936.

Patented Mar. 23, 1909.

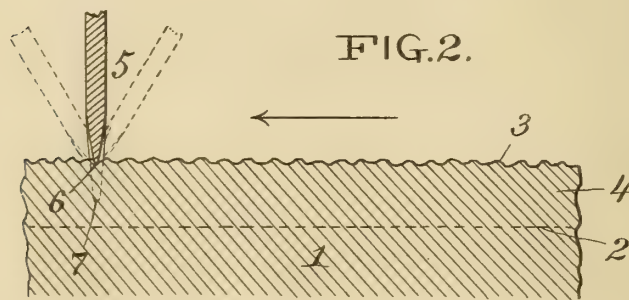
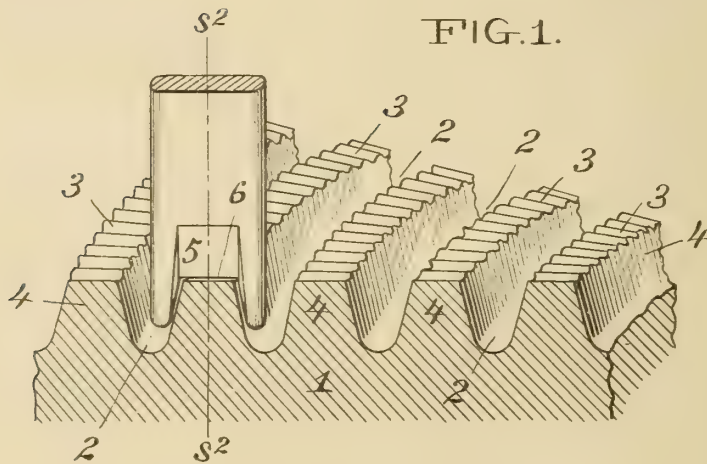


FIG. 3.

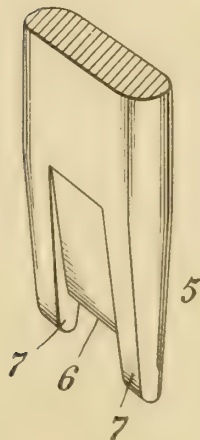


FIG. 4.



WITNESSES:
Frank Comer
W. H. Humphrey

INVENTOR
George R. Cheney
 BY *W. H. Humphrey*
 ATTORNEY

UNITED STATES PATENT OFFICE.

GEORGE K. CHENEY, OF NEW YORK, N. Y., ASSIGNOR, BY MESNE ASSIGNMENTS, TO VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW JERSEY.

REPRODUCING-STYLUS FOR TALKING-MACHINES.

No. 915,936.

Specification of Letters Patent.

Patented March 23, 1909.

Application filed June 6, 1903. Serial No. 160,429.

To all whom it may concern:

Be it known that I, GEORGE K. CHENEY, a citizen of the United States of America, and a resident of the borough of Manhattan, city, county, and State of New York, have invented certain new and useful Improvements in Reproducing-Styluses for Talking-Machines, of which the following is a specification.

My invention relates generally to talking machines and consists more specifically of an improved form of reproducer adapted for use in connection with the sound record described and claimed in my co-pending application Serial No. 160,431 filed June 6, 1903. The record referred to is preferably of the disk type having a spiral groove cut or otherwise formed in its face and the record in the form of a connected series of indentations contained on the thread or that portion of the surface of the disk remaining between the turns of the spiral groove.

The reproducer point is preferably of suitable form to engage both the record thread and the groove on one or both sides thereof, it being thereby guided and maintained in proper relation to the record, also fed across the disk as the latter is rotated.

By reducing the bearing surface of the reproducer to the extreme point of the stylus and forming the spiral guide groove with perfectly smooth walls, unpleasant sounds, such as harsh, shrill tones and grating noises, may be either entirely avoided, or so greatly reduced as to be rendered unnoticeable.

The preferred form of reproducer embodying my invention, is illustrated in the accompanying drawings, throughout the several views of which like characters of reference indicate corresponding parts.

In these drawings: Figure 1 is a view in perspective on a greatly enlarged scale, showing a portion of a disk sound record and the reproducer point or stylus in operative relation thereto. Fig. 2 is a vertical sectional view taken centrally of the record thread, on the line s^1 , s^2 , of Fig. 1. Fig. 3 is a detail view in perspective of the reproducer point, and Fig. 4 is a vertical sectional view thereof.

Referring now to the drawings, 1, indicates the sound record, which may be of the disk or cylinder type. A spiral groove 2, is formed in the face of the disk or cylinder and the record in the form of a connected

series or succession of indentations 3, is contained on that portion, 4, of the disk or cylinder surface remaining between the turns of the spiral groove.

The reproducer point or stylus 5, may be made of any suitable material such as steel or the like, but owing to the necessity for frequently renewing the same, when made of metal, I prefer to use sapphire or similar stone, which may be used repeatedly without showing appreciable wear.

The bearing surface 6, of the stylus, is preferably straight, to conform to the upper surface of the record thread and is preferably beveled on opposite faces, so that its cross section is approximately V-shaped, as best shown in Fig. 4.

In order that the reproducer may guide and feed automatically, it is provided with a depending lug 7, at one or both ends of the bearing surface, such lugs being adapted to enter the spiral groove of the disk. Two of these lugs are preferably employed and thus constructed, the stylus straddles the record strip, as shown in Fig. 1, and while free to move up and down in following the indentations of the record, its lateral play is limited.

The recorder may be set vertically to cooperate with the horizontally disposed surface of the rotating record disk, or it may be inclined either toward the right or left as indicated by dotted lines in Fig. 2.

In use, it will be seen that as the walls of the groove are perfectly smooth, the surface thereof in passing in contact with one or the other of the guide lugs on the stylus, will not produce noticeable sounds of an unpleasant character and as the distance separating these lugs may exceed somewhat the width of the record strip, contact between the surface of the groove and the lugs will only occur at intervals. The stylus will therefore have a bearing normally on the record thread only at its extreme point, and in consequence, the objectionable scratching or grating noises will be to a great extent overcome.

The stylus or reproducing point may be mounted in operative relation with a suitable sound box and phonetically connected with the diaphragm thereof in any well known or suitable manner.

The advantages and method of operation will be apparent from the foregoing description.

I do not wish to be understood as limiting

myself to the exact details of construction shown and described, as various changes might be made without departing from the spirit and scope of my invention. For example, the bearing surface of the stylus might be given more or less curvature to conform to a record strip having a rounded surface. My improved stylus may also be used in connection with a record thread having lateral undulations as well as those having undulations upon their tops or edges. All such modifications, however, I consider obvious and immaterial variations of form and not of substance and still within the meaning of the present invention.

Having, therefore, described my invention, I claim:

1. As an article of manufacture, a reproducing stylus for talking machines having a pair of longitudinal extensions, the inner sides of which are adapted to form guides for said stylus and having a portion located between said extensions adapted to guide and retain said stylus in position longitudinally and to contact for substantially its whole length with the active surface of the record.

2. As an article of manufacture, a reproducing stylus for talking machines having a pair of longitudinal extensions, the sides of which are adapted to form guides for said stylus and a portion located between said extensions adapted to contact for substantially its whole length with the active surface of the sound record.

3. As an article of manufacture, a reproducing stylus having a pair of longitudinal extensions, the inner sides of which are adapted to form guides for said stylus and having an edge located between said extensions to contact for substantially its whole length with the top of an undulatory record thread.

4. As a new article of manufacture, a reproducing stylus for talking machines having a straight edge engaging for substantially its whole length the active surface of the record, lateral play of the stylus being limited by the side walls of the notch.

5. As a new article of manufacture, a reproducing stylus for talking machines, said stylus being notched to straddle the record thread and having a straight edge of approximately V-shaped cross section engaging the record.

6. As an article of manufacture, a flattened reproducing stylus one end of which is provided with a transverse notch, the bottom edge of said notch being sharpened to form a wedge-shaped portion to contact for substantially its whole length with the active surface of the record, the portions of said

stylus adjacent either side of said wedge-shaped portion forming guides to feed the stylus across the record.

7. As an article of manufacture, a flattened reproducing stylus provided with a substantially rectangular notch in the end thereof, the bottom of said notch being sharpened to form a wedge-shaped portion to contact for substantially its whole length with the active surface of the record, the portions on either side of said wedge-shaped portion forming guides to feed the stylus across the record.

8. A reproducing stylus having its engaging extremity beveled down to a straight edge, the said beveled portion being situated between a pair of adjacent surfaces projecting beyond said edge.

9. A reproducing stylus having the middle portion of its engaging end beveled down to a straight edge and its side portions projecting beyond said edge.

10. A stylus having a portion provided with a straight edge adapted to engage the undulatory surface of the record and spaced projections for limiting the lateral play of the stylus.

11. A reproducing stylus having a portion provided with a straight edge, and a portion projecting beyond said edge to guide said stylus.

12. A reproducing stylus having a portion provided with an edge adapted to contact for substantially its full length with the active surface of the record, and having spaced projections for limiting the lateral play of the stylus upon said surface.

13. A reproducing stylus having a straight edge to engage the undulatory surface of the record, and having means for limiting the lateral play of said stylus.

14. A reproducing stylus having a substantially straight edge extending substantially at right angles to the longitudinal axis of said stylus, and having a portion extending longitudinally of said stylus beyond said edge to guide said stylus.

15. A reproducing stylus having an edge adapted to contact with the active surface of the record, and having spaced projections for limiting the lateral play of the stylus upon said surface.

16. The combination with a stylus of spaced projections for limiting the lateral play of the stylus.

Signed at New York, N. Y. this 4th day of June, 1903.

GEORGE K. CHENEY.

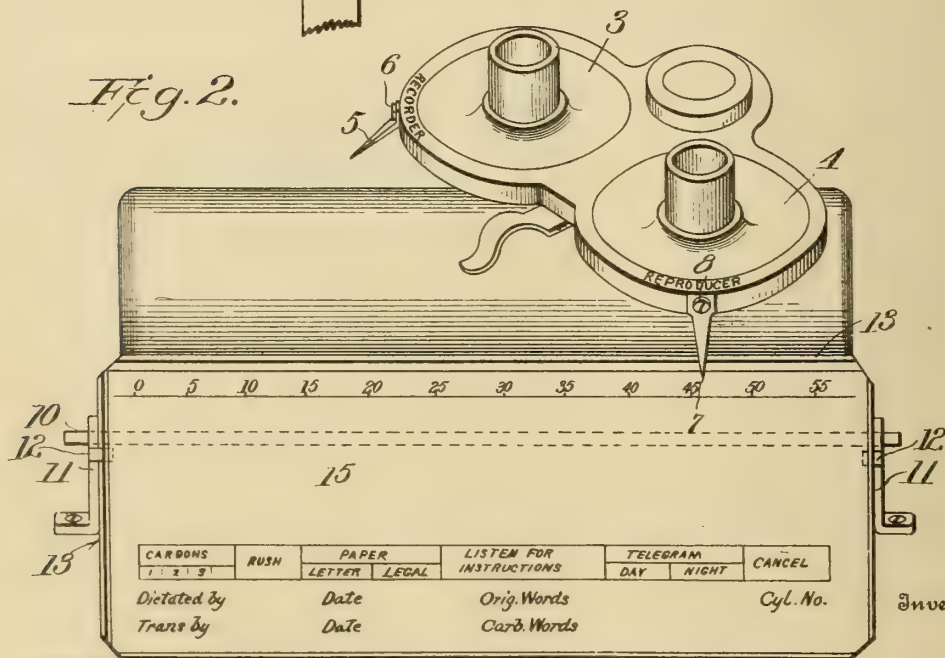
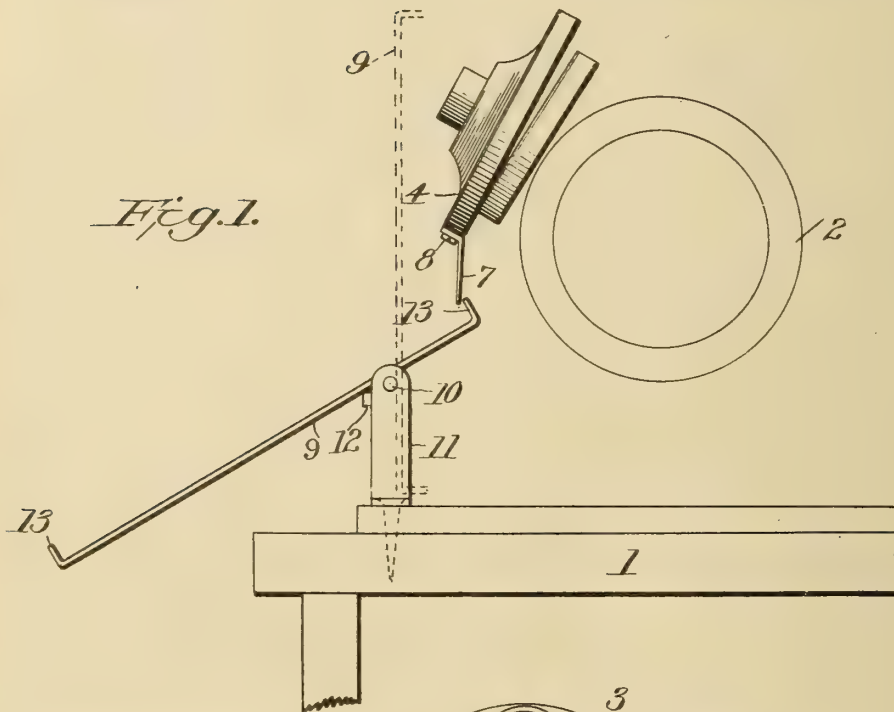
Witnesses:

J. E. PEARSON,
W. H. PUMPHREY.

R. C. FARRINGTON.
 PHONOGRAPH.
 APPLICATION FILED JUNE 27, 1908.

916,287.

Patented Mar. 23, 1909.



Witnesses
E. H. Walker
J. T. Walker

By *R. C. Farrington*
Sturtevant & Mason
 Attorneys

UNITED STATES PATENT OFFICE.

RICHARD C. FARRINGTON, OF BOISE, IDAHO.

PHONOGRAPH.

No. 916,287.

Specification of Letters Patent.

Patented March 23, 1909.

Application filed June 27, 1908. Serial No. 440,667.

To all whom it may concern:

Be it known that I, RICHARD C. FARRINGTON, a citizen of the United States, residing at Boise, in the county of Ada, State of Idaho, have invented certain new and useful Improvements in Phonographs, of which the following is a description, reference being had to the accompanying drawing and to the figures of reference marked thereon.

The invention relates to new and useful improvements in phonographs and has for its object to provide a device whereby predetermined positions on a record receiver may be readily found and instructions indicated in connection therewith, if desired.

The invention consists in the parts and improvements hereinafter described and set forth in the appended claims.

In the drawings which show by way of illustration, only one embodiment of the invention: Figure 1 is a side elevation of the essential parts of a phonograph embodying my invention. Fig. 2 is a front view of the same.

In the present illustrated embodiment of my invention, I have shown the essential parts of the Edison commercial phonograph. It will be understood however, that my invention is applicable to phonographs of any type whatever, whether of the record cylinder type, or the record disk type.

In the drawings, 1 is the phonograph box or frame, on which is supported in the usual manner, the record receiver 2. The record receiver is rotated in the well known manner. Coöperating with the record receiver, is a recorder 3, and a reproducer 4. All of the above parts are common to the Edison phonograph, and further illustration and description is not thought necessary.

The recorder is provided with a pointer 5, which is secured thereto by a screw 6. The reproducer is also provided with a pointer 7, secured thereto by a screw 8. These pointers are so disposed as to have the same position relative to the record receiver, when brought to operative position.

At the forward part of the machine, I have provided a tray or holder 9. Said tray as herein shown, is provided with a rod 10, which is preferably soldered to the back of the tray 9, and extends slightly beyond the ends of the tray. Suitable brackets 11 are secured to the top plate of the phonograph and are provided with eyes at their upper ends to receive the rod 10. An arm or lug

12 carried by the brackets 11, serve as a support for the tray when in the position shown in full lines in Fig. 1.

When desired to place the top on the phonograph, the tray is swung about the hinged connection with the brackets into the position shown in dotted lines. Said tray is preferably supported so that the upper edge thereof is underneath and slightly in rear of the pointer carried by the recorder or reproducer, which is in operative position.

The tray or holder has an upwardly turned lip 13. The tray or holder is adapted to receive an index or memorandum card or sheet 15, which is of such size as to be held by the upturned lip 13, in a definite position on the tray or holder.

The index or memorandum sheet has printed thereon, certain instructions. Near the upper edge said sheet may be provided with a series of numbers such as 0, 5, 10, 15 etc., running from left to right across the upper edge of the sheet. If desired, said numbers may be entirely omitted and a line printed thereon, parallel with the upper edge of the sheet. Said sheet may also have a blank space where notes may be written if desired. A scale may be placed on the upper edge of the tray or holder if desired, which would be similar, of course, to the scale now used on phonographs.

In the operation of my device, the pointer travels along the upper edge of the index sheet which is always held in a predetermined position relative to the record receiver. The dictator may therefore, indicate on the index sheet any instructions desired, relative to the various parts of the record. The part of the record to which attention is to be called, may be indicated on the sheet by a suitable mark such as a check or figure or any other character which will indicate the position of the pointer relative to the sheet at this time. If it is desired to rush a letter beginning at this point, the dictator draws a line from the check mark to the word "rush" on the sheet. Any other directions desired may thus be given. The transcriber then takes the index sheet, and by placing the same on the tray or holder brings said sheet into the same position relative to the record receiver, that it has when marked by the dictator. If the pointer is brought to the check mark, the particular record which was desired rushed, may be found and

transcribed. Various other uses of my device will readily suggest themselves to those skilled in the art to which my invention appertains.

5 It will be obvious that if my device be used in connection with a phonograph wherein there is a combined recorder and reproducer only a single pointer would be necessary.

10 Having thus particularly described my invention, what I claim as new and desire to secure by Letters Patent, is:—

15 1. The combination with a phonograph, including a record support, of a memorandum sheet holder mounted on said phonograph in a fixed position longitudinally, relatively to the record support and having means to hold a memorandum sheet thereon in fixed relation longitudinally of said record support.

20 2. The combination with a phonograph including a record support, a recorder and reproducer movable relative to the record support, indicating means movable with said recorder and reproducer, of a memorandum sheet holder mounted on said phono-

graph in close proximity to said indicating means and in a fixed position relative to the movements of said recorder and reproducer and having means to hold a memorandum sheet thereon in fixed relation relatively to the movements of said recorder and reproducer. 30

3. A phonograph mechanism, comprising a record receiver and a memorandum sheet mounted and disposed in fixed relation longitudinally of said record receiver, said sheet being adapted to receive a series of indications thereon in close proximity to said record receiver to indicate the matter at any particular point on said record receiver, said sheet having a series of complementary indications to indicate the treatment or disposal of the matter at the point or points indicated by said former indications. 40

In testimony whereof I affix my signature, in presence of two witnesses.

RICHARD C. FARRINGTON.

Witnesses:

L. S. KNOX,

DEAN R. DAYNES

O. G. ROSE.
SOUND REPRODUCING INSTRUMENT.
APPLICATION FILED APR. 24, 1908.

916,603.

Patented Mar. 30, 1909.

Fig. 1.

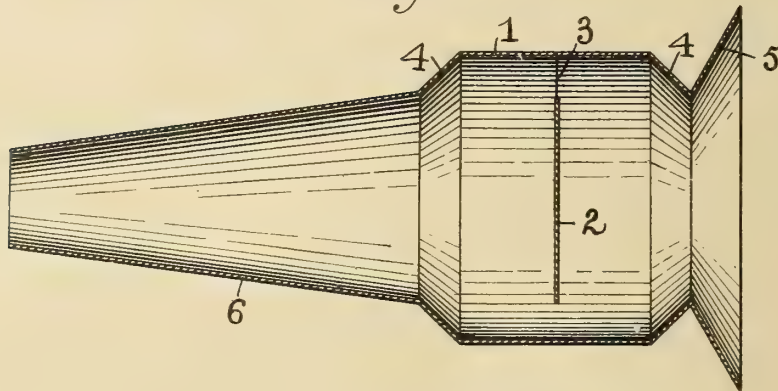


Fig. 2.

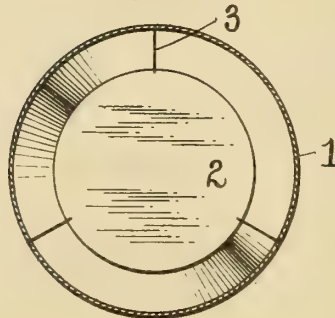
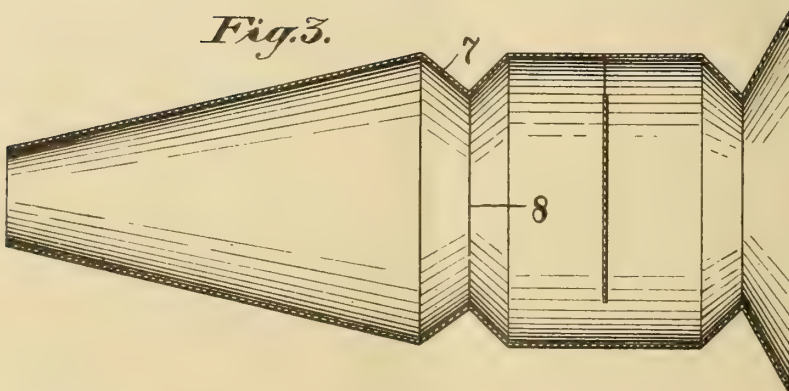


Fig. 3.



WITNESSES:

J. H. Thiedner
Edward H. Sartou

INVENTOR

Oscar G. Rose

BY

Spear & Seely

ATTORNEY

UNITED STATES PATENT OFFICE.

OVEREND G. ROSE, OF CAMP MEEKER, CALIFORNIA.

SOUND-REPRODUCING INSTRUMENT.

No. 916,603.

Specification of Letters Patent.

Patented March 30, 1909.

Application filed April 24, 1908. Serial No. 429,048.

To all whom it may concern:

Be it known that I, OVEREND G. ROSE, a citizen of the United States, residing at Camp Meeker, in the county of Sonoma and State of California, have invented certain new and useful Improvements in Sound-Reproducing Instruments, of which the following is a specification.

In an application for Letters Patent of the United States of even date herewith, I described a focusing and analyzing device for sound waves comprising a box or chamber having therein a focusing and analyzing disk arranged at right angles to the course of the sound waves, and having the function of focusing the sound waves and analyzing and splitting them up so that, as reproduced, the sounds will occupy the same relative positions which they occupied when originally played or otherwise produced when making the original record.

My present invention relates particularly to the combination of the focusing and analyzing device of the character just mentioned with a hollow or tubular extension whereby the device may be directly associated with the reproducing instrument without the intervention of a horn. This connecting member, with the analyzing device, may be attached to either a disk or a cylinder talking machine. They will take the place of the horn and analyze, focus, and augment the sounds from the reproducer.

The invention consists in the features and combination and arrangement of parts hereinafter described and particularly pointed out in the claims.

In the accompanying drawings Figure 1 is a longitudinal sectional view through one embodiment of my invention; Fig. 2 is a cross sectional view through the device of Fig. 1; and Fig. 3 is a modified form of the apparatus.

In these drawings 1 indicates the sound box or chamber in which is arranged the focusing and analyzing disk or diaphragm 2 which is held by hair like wires 3 which are taut and hold the disk in a manner to be sensitive to the finest sound waves. The box at each end is of conical form, as at 4, and at the end from which the sounds are emitted the conical portion 4 connects with a flaring

truncated conical extension 5 which is of larger diameter than the box and serves as a reflector for the sound waves. At the other end the box is provided with a hollow extension 6 of preferably conical form tapering outwardly so that its smaller end is of such a diameter as will enable it to be attached to the reproducing instrument. The larger end of this conical extension coincides in diameter with the opening of the truncated end of the box, and forms with it an annular diaphragm or opening for the sound waves to enter, as in the device described in the application above referred to.

Instead of the form shown in Fig. 1, I may provide, intermediate the sound box and the conical extension or connecting tube, an inverted truncated conical portion 7. This also provides an opening or air diaphragm at 8 through which the sound waves pass before striking the analyzing disk. I prefer, however, the form shown in Fig. 1, as the sound waves will be conducted by the tubular extension 6 directly to the sound box. The tubular extension 6 is designed for direct attachment to the reproducing machine, and, as a result of this use the reproduced sounds are as loud as when the sound box is used with the ordinary horn. I secure the additional advantage of compactness and simplicity, it being possible to pack the device within a small compass.

When the attachment is used in connection with a disk machine, the conical connecting tube 6 at its smaller end is adapted to fit into the horn socket on the machine. In the case of cylinder machines the free end of the conical piece is prolonged or is extended to such a point that the end is small enough to fit the rubber tubular connection extending from the reproducing machine. In the form of machine known as the Columbia tapering tone arm cylinder machine, the connecting tube 6 may be fitted into the horn socket.

I claim as my invention:

1. A tapered horn for sound reproducing instruments, having a hollow truncated continuation thereof at or near its outer end and a disk suspended adjacent said truncated portion, substantially as described.

2. A tapered horn for sound reproducing
instruments having a hollow truncated con-
tinuation thereof at or near its outer end
and a disk suspended adjacent the said trun-
cated portion and a flared portion beyond
5 the hollow truncated portion substantially
as described.

In testimony whereof I have affixed my
signature, in presence of two witnesses, this
28th day of February 1908.

OVEREND G. ROSE.

Witnesses:

FRANK L. OWEN,

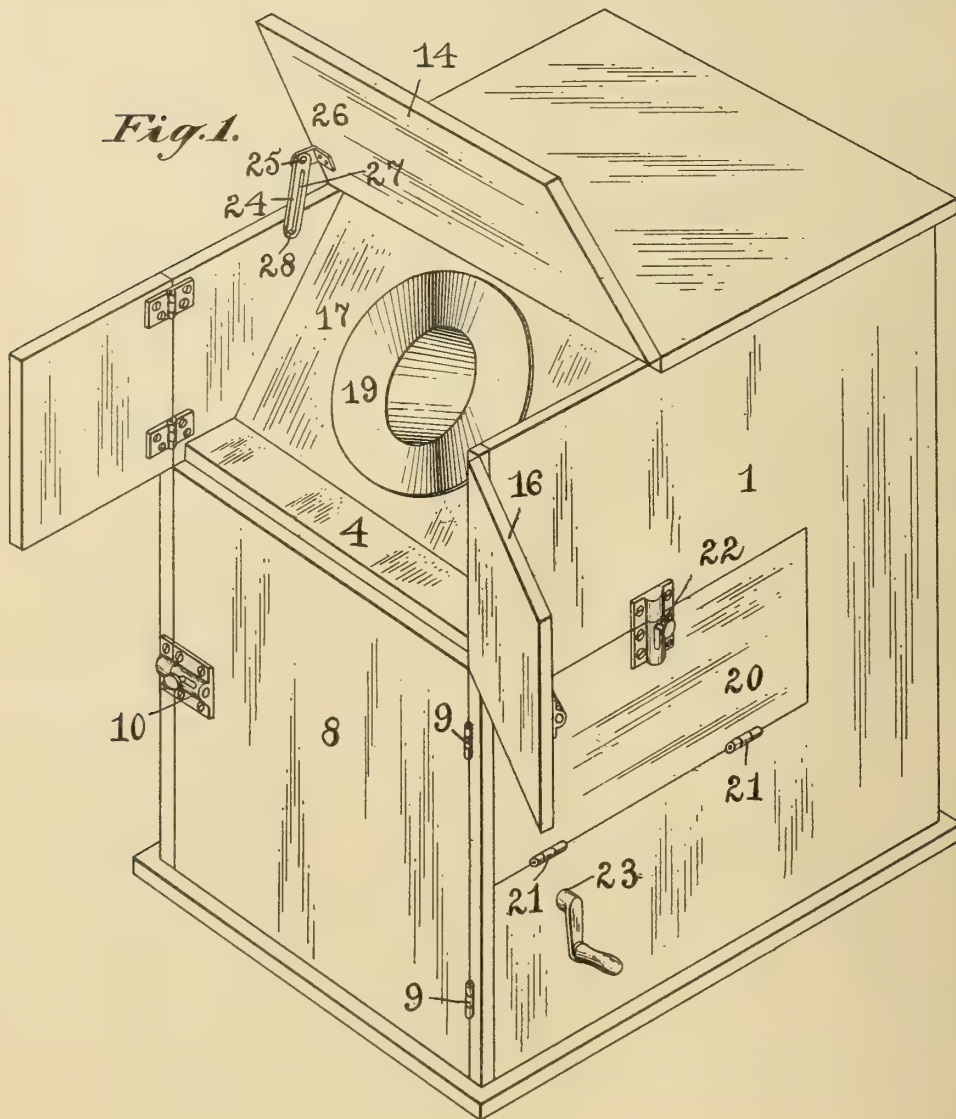
F. M. BARTEL.

O. G. ROSE.
CABINET FOR SOUND REPRODUCING APPARATUS.
APPLICATION FILED APR. 24, 1908.

916,604.

Patented Mar. 30, 1909.

2 SHEETS—SHEET 1.



WITNESSES:

J. C. Fiedner
Edward N. Sarter

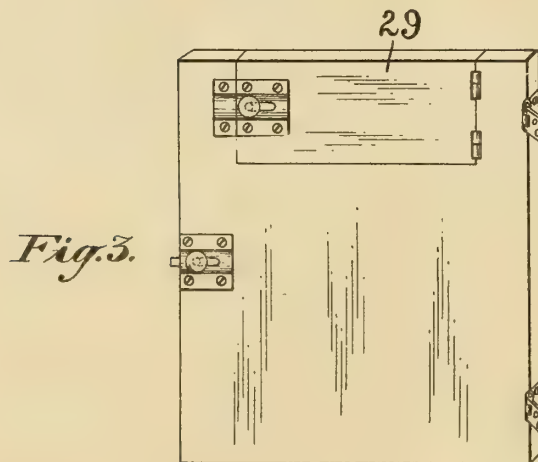
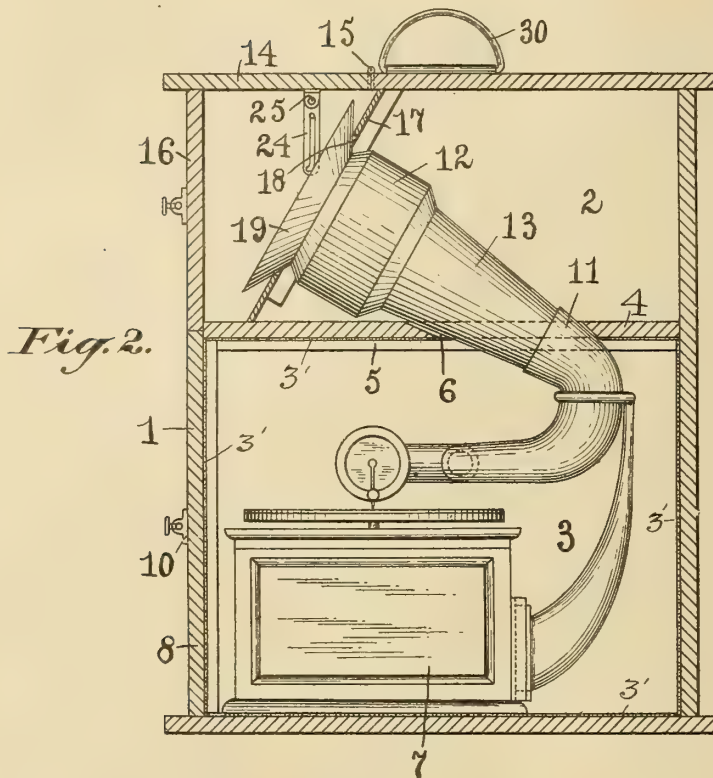
INVENTOR

O. G. Rose
BY
Spencer Seely
ATTORNEY

O. G. ROSE.
CABINET FOR SOUND REPRODUCING APPARATUS.
APPLICATION FILED APR. 24, 1908.

916,604.

Patented Mar. 30, 1909.
2 SHEETS—SHEET 2.



WITNESSES:
J. C. Thiedner
Edward W. Sartor

INVENTOR
Oberend G. Rose
BY *Spear & Seely*
ATTORNEY

UNITED STATES PATENT OFFICE.

OVEREND G. ROSE, OF CAMP MEEKER, CALIFORNIA.

CABINET FOR SOUND-REPRODUCING APPARATUS.

No. 916,604.

Specification of Letters Patent.

Patented March 30, 1909.

Application filed April 24, 1908. Serial No. 429,049.

To all whom it may concern:

Be it known that I, OVEREND G. ROSE, a citizen of the United States, residing at Camp Meeker, in the county of Sonoma and State of California, have invented certain new and useful Improvements in Cabinets for Sound-Reproducing Apparatus, of which the following is a specification.

My invention relates to appliances for use with sound reproducing apparatus, and concerns particularly a cabinet or casing for containing the sound reproducing apparatus and the parts associated therewith whereby the horn, sound box or equivalent device may be properly arranged in relation to the sound reproducing machine, and whereby also the sound reproducing machine may be completely inclosed, together with its associated delivering device, one object which is attained by my invention being that the scratching noise of the needle and the operation of the machinery will be eliminated from the sound as delivered from the horn or sound box, and another object attained by me is the facility with which the horn, sound box, analyzer, or focusing device may be associated with the reproducing instrument.

In an application of even date herewith I described a focusing and analyzing attachment for reproducing machines in which a sound box or chamber is employed having therein a focusing and analyzing diaphragm. In one form of this device I employ an extension tube to form a direct connection between the sound box and the horn receiving socket of the instrument.

By the use of the cabinet of my present invention I am enabled to quickly convert any tapering tone arm disk machine or a machine known as the new Columbia tapering tone arm cylinder machine into a so called hornless talking machine, and yet my invention can, if desired, be used with an ordinary horn with or without my sound box attachment, or the sound box attachment can be used without a horn of ordinary form.

The invention consists in the features and combination and arrangement of parts hereinafter described and particularly pointed out in the claim.

In the drawings—Figure 1 is a perspective view of a cabinet built according to my invention, the parts being adjusted for use; Fig. 2 is a vertical sectional view of the cabinet with the reproducing machine and sound

box in place therein and in elevation; and Fig. 3 is a detail view of a modified form of front door for the cabinet.

The cabinet comprises a casing formed of any suitable material indicated at 1, divided into two compartments 2, 3 by a partition 4 in the form of a slide which is removably held within the casing upon ledges, one of which is shown at 5. In this slide or partition an oval shaped slot or opening is formed at 6.

The reproducing machine, which may be of ordinary form, is indicated at 7, and this is placed into position within the compartment 3 through a front door 8 hinged to the frame of the cabinet at 9 and provided with a lock or bolt at 10 by which the door may be held closed. The reproducing machine is placed in this compartment by opening the door, the slide 4 being removed, and after the reproducing machine is located in proper position the slide 4 is introduced into place, it being slid or moved into the casing in a slightly inclined position so as to avoid the upwardly extending horn socket 11 of the reproducing machine, and then the slide is let down into the position shown in Fig. 2 with the horn socket slightly protruding into or through the oval shaped slot 6.

The sound box is indicated at 12 and its tubular extension at 13. This tubular extension is adapted to fit snugly within the horn socket 11 and it is introduced therein after the reproducing machine has been placed in position, together with the sliding partition 4, the connecting tube 13 extending in inclined position through the oval shaped slot 6.

The upper compartment 2 is provided with a series of doors consisting of an upper door 14 hinged at 15 to the top of the cabinet and adapted, when in closed position, to form a continuation of said top. The other doors comprise the horizontal swinging member 16 at the front of the compartment hinged to the upright sides of the cabinet, as indicated in Fig. 1. There is also provided in the upper compartment 2 an inclined sound ing board 17 which is removably held in position and is supported on inclined cleats on the sides of the compartment. This sound ing board has an opening 18 through which the sound delivering device extends. In the present instance I have shown the sound delivering device as consisting of the sound box above described having the flaring re-

flector 19 which protrudes through the opening 18.

The lower compartment 3 is lined throughout including the under side of the slide 4 with felt or similar material to make this compartment sound proof, this lining 3' extending also over the inner side of the door 8 and also over the inner side of a supplemental door 20 hinged at 21 to the side of the casing and held in place by a bolt or lock 22. By thus lining the lower compartment the objectionable noise of the machinery and the scratching sound of the needle will be deadened and entirely prevented from passing out of the cabinet and mingling with the sound which is reproduced from the instrument. The front door 8 closes tight against the front edge of the slide or partition 4, and aids in this effect. The side door 20 is for the purpose of giving access to the reproducing machine to place or remove the needle and to start and stop the machine and put on or take off the record, and below this door an opening is provided in the side wall of the cabinet at 23 through which the winding handle or crank of the instrument may be inserted.

In placing the instrument and its associated parts within the cabinet the reproducing machine, together with the bracket holding the tone arm, is placed therein as above described. The partition 4 is then placed in position, the doors of the upper compartment 2 being now open. The front door 8 is now closed and the sounding board is slid into position on its cleats or in its grooves, and the sound box or other delivering device is passed through the opening in the sound board, and the tapered end thereof fitted snugly into the horn socket, the reflector now lying against the sounding board. The hinged cover 14, when the apparatus is in position for use, is raised into the inclined position shown in Fig. 1 where it is held by the link 24 pivoted at 25 to ear 26, supported on the said upper door, the said link being slotted at 27 and when raised being supported by a pin 28 on the inner side of the cabinet. The small doors at the front are now adjusted into the desired position, such, for instance, as shown at Fig. 1, and the apparatus is ready for the operation of the reproducing machine in the ordinary way, and the sound waves are emitted from

the sound delivering device consisting of the sound box or any other suitable device, such as a horn, and this sound is a perfect reproduction of that recorded, being free from the scratching noise of the needle and the noise resulting from the operation of the reproducer.

For certain forms of machines such as that known as the new Columbia tapering tone arm cylinder machine, an extra door or flap is provided at 29 at the top of the front door, this being hinged as shown at Fig. 3 but swinging horizontally to one side permitting access to the lower compartment to enable a person to start and stop the machine and run the reproducer along the cylinder. The cylinder may be placed in position through the side door and this is true also of the disk carrying the record when this style of machine is used.

To remove the machine the front doors are opened, the sound box and the sounding board are removed, the sliding partition is pulled out and then the reproducing machine is removed.

The whole operation of placing the machine and the sound delivering box or device and of removing these parts can be very quickly performed. The cabinet will, of course, protect the machine and its associated parts from dust and it may be used as a transporting case, it being provided at 30 with a suitable handle.

I claim--

A cabinet for sound reproducing instruments comprising lower and upper compartments, a partition separating said compartments, said lower compartment having a lining of sound deadening material, an inclined sound board in the upper compartment dividing the same into front and rear portions, said sound board and partition having openings therein for the passage of the sound delivering means, and means for opening and closing that portion of the upper compartment in front of the sound board.

In testimony whereof I affixed my signature, in presence of two witnesses, this 28th day of February 1908.

OVEREND G. ROSE.

Witnesses:

FRANK L. OWEN,
F. M. BARTEL.

P. BASTIAN.
STOP FOR PHONOGRAPHS.
APPLICATION FILED MAY 10, 1907.

916,973.

Patented Apr. 6, 1909.

Fig. 1.

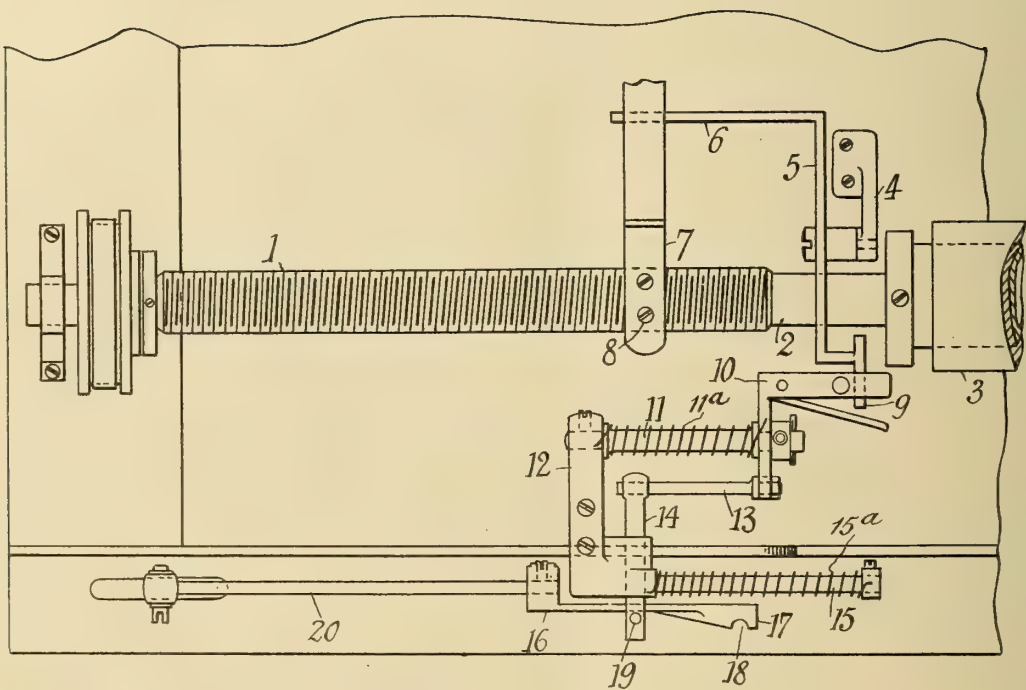
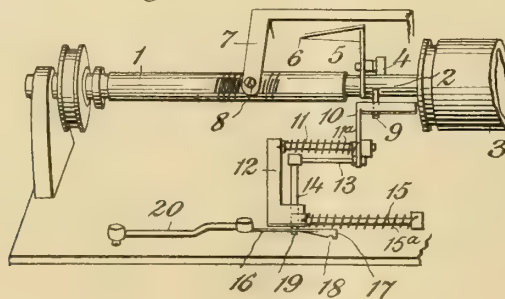


Fig. 2.



Witnesses:
J. Chaturu
E. Chaturu

Inventor:
P. Bastian
By J. W. Henschel
Att'y.

UNITED STATES PATENT OFFICE.

PAUL BASTIAN, OF STUTTGART, GERMANY, ASSIGNOR TO WILHELM RECLAM, OF STUTTGART, GERMANY.

STOP FOR PHONOGRAPHS.

No. 916,973.

Specification of Letters Patent.

Patented April 6, 1909.

Application filed May 10, 1907. Serial No. 372,900.

To all whom it may concern:

Be it known that I, PAUL BASTIAN, a subject of the German Emperor, residing at Stuttgart, Württemberg, in the Empire of Germany, have invented a new and useful Improvement in Stops for Phonographs, of which the following is a specification.

The object of the invention is to provide a reliable stop for automatically arresting the rotation of the phonograph cylinder at the end of each tune and thus prevent over-running or damage to the reproducing mechanism thereof.

The annexed drawings illustrate the invention as applied to a phonograph of which are shown only the parts immediately connected with the automatic stop-mechanism, viz: a portion of the record cylinder, mandrel, operating screw shaft and pulley and a portion of the arm on the screw shaft for working the sound box.

Figure 1 is a plan; and Fig. 2 is a perspective view of the parts mentioned.

The ordinary operating screw shaft 1 carries on its plain portion 2 the mandrel and cylinder 3 near which is fixed on the phonograph box a bracket 4 carrying a pivoted lever 5 with a tapered crank arm 6 against which the arm 7 of the sound box moves toward the end of the record and while traveling along such tapered crank-arm 6, it causes the lever 5 to turn on its pivot. The screws 8 are those ordinarily used for securing the usual feed nut to arm 7. The lever 5 has a further crank arm 9 in engagement with a rocking lever 10 pivotally connected on the pin 11 furnished with a torsion spring 11' adapted to keep the lever in contact with the arm 9. The pin 11 is rigidly connected to an angular block 12. The rocking lever 10 has a fixed stem 13 loosely engaged with the stop- or lock-bar 14 fixed to the inner end of a round bar 15 mounted in a bearing in

the block 12. The bar 15 is under control of a torsion spring 15'. The outer end of the lock-bar 14 carries a pin 19 which normally bears against a co-acting spring-arm 16 formed with a wedge-shaped end 17 and groove 18 and whose socket end is firmly fixed to the brake bar 20 of the phonograph mechanism.

By pushing the brake rod 20 toward the adjacent end of the box, the groove 18 of the spring-arm 16 will engage with the pin 19 and be held thereby while the arm 7 of the sound box travels in the direction of the record cylinder. When the arm 7 reaches the end of its operative travel and moves longitudinally along the tapered edge of the arm 6 of the lever 5, it causes the latter to swivel. In this manner the arm 9 rocks the lever 10 which in turn and by its stem 13 operates the lock-bar 14 so as to lift the pin 19 thereof away from the groove 18 of its co-acting spring-arm 16. Immediately the latter becomes free, it will be pulled away with the brake rod 20 by the action of the usual tension spring, not shown, and thus enables the ordinary brake to arrest the rotation of the record cylinder.

I claim:

In automatic stop-mechanism for phonographs, the combination with the screw-operated traveling arm, of a two-armed pivoted and tapered lever, a spring-controlled rocking lever in combination with said lever, a lock-bar connected with said rocking lever and a co-acting grooved spring-arm for said lock-bar, and a phonograph brake rod fast on the end of said spring-bar, as set forth.

PAUL BASTIAN.

Witnesses:

ADALBERT BAUER.
ERNST EITENMANN

P. DE BEAUX.
SOUND REPRODUCING BOX FOR DISK TALKING MACHINES.
APPLICATION FILED JUNE 12, 1907.

916,976.

Patented Apr. 6, 1909.

Fig.1.

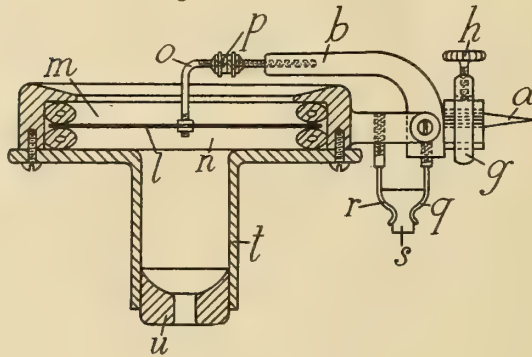


Fig.3.



Fig.2.

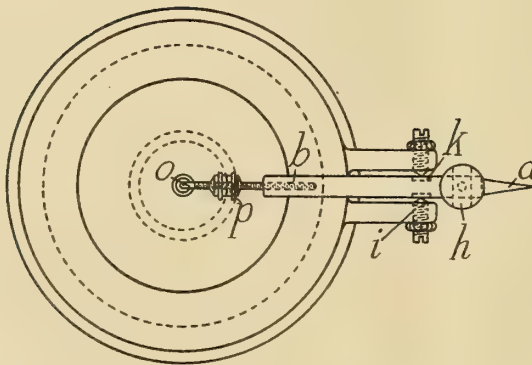


Fig.4.

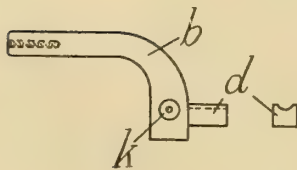
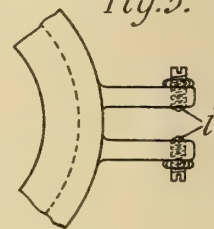


Fig.5.



Witnesses:
South & H. Beaux
Manufacturers

Inventor
Paul de Beaux
per *W. H. Hopper*
Attorney.

UNITED STATES PATENT OFFICE.

PAUL DE BEAUX, OF LEIPZIG, GERMANY.

SOUND-REPRODUCING BOX FOR DISK TALKING-MACHINES.

No. 916,976.

Specification of Letters Patent.

Patented April 6, 1909.

Application filed June 12, 1907. Serial No. 378,583.

To all whom it may concern:

Be it known that I, PAUL DE BEAUX, watchmaker, a subject of the King of Saxony, and residing at No. 8 Markgrafenstrasse, Leipzig, in the Kingdom of Saxony, German Empire, have invented certain new and useful Improvements in Sound-Reproducing Boxes for Disk Talking-Machines, of which the following is a specification.

10 The object of this invention is to do away with the secondary sounds to be found even in talking-machines of very perfect make. These sounds are due to the parts neighboring to the sound-plate, *i. e.* to the vibrations
15 of these parts and my invention therefore consists in improvements in the construction, shape, and material of the said parts.

In the accompanying drawing, Figure 1 is a vertical section through my improved
20 sound-reproducing box, Fig. 2 is a plan of the same, Fig. 3 shows the means for fastening the stylus *a* to the lever *b*, Fig. 4 is a separate view of the lever *b* and some neighboring parts, and Fig. 5 is a plan of the bearing for said lever.

The stylus *a* is carried by an arm which is composed of two portions *b* and *o*. The portion *b* consists of aluminium and has a projection *d* adapted to receive the stylus
30 *a*; the latter is secured in position by means of an oblong ring *g* having a hand-screw *h* intermediate piece *e* located between this screw and the stylus, and another intermediate piece *c* located between the projection *d* and the ring *g* and consisting of
35 brass. The parts *d* and *e* have each a groove for the reception of the stylus, but the groove of the part *e* is covered with a comparatively thick layer of tin. Owing to the coefficients of vibration of these different materials being also different, the transmission
40 of the secondary sounds from the stylus to the sound-reproducing plate is weakened or impeded so very thoroughly that the ear is
45 unable to detect any such sound. The portion *b* of the stylus-carrying arm is supported by and between steel screws *i* the pointed ends of which take into very fine cavities provided in small steel plates *k k* attached to said portion. The diaphragm *l*
50 consists also of aluminium and is held between rings *m n* of india-rubber, felt, or the like. The diaphragm is connected with the portion *o* of the stylus-carrying arm consisting of a bent wire of hardened steel. One part of this wire is screw-threaded and fur-

nished with an adjustable nut *p* for the purpose of making the wire sometimes "off" more or less right in regard to the position of such nut thus preventing the wire *o* to vibrate in its entirety and in full force and to produce disturbing metallic sounds and noises.

To damp, weaken, or suppress the mediant effect of the pushing, shoving, or jerking admitted from the stylus, the portion *b* has a spring *q* holding it to a frame with a similar spring *r* fixed to the frame of said portion, a piece *s* of india-rubber, felt, cork, or the like. This means is at the same time of very favorable effect for the purriness of the sounds reproduced. The vibrations of the diaphragm are furthermore not in the least disturbed by ever so great a speed of reception or reproduction, because aluminium is chosen as material for this diaphragm and this material has just the proper degree of elasticity. Finally the sounds produced or reproduced are first compelled to pass into and through a tube-like chamber *t* forming an extension of
80 the casing of the sound-box. This chamber has a mouth-piece *u* consisting of wood, ebonite, or another material of low vibratory capacity, so that also by this means the sound-box is prevented from producing
85 sounds of its own. Therefore all these parts cannot be allowed to produce sound of their own, *i. e.* disturbing sounds, and they are prevented from so doing by the choice of different materials having also different shapes, these materials being moreover such as are
90 unable to produce sounds of a disturbing strength; finally, the secondary sounds still arising are effectively damped by the damping materials provided particularly for this purpose.

Having now described my invention, what I desire to secure, by a patent of the United States, is:

1. In a sound reproducing box for disk talking machines, a box casing, a diaphragm and its bearing parts in combination with a stylus-carrying arm composed with the diaphragm and composed of several portions of different material and having different coefficients of vibration, a stylus held in place upon said arm by an adjustable nut-piece having a layer of tin and forced upon said stylus by a hand-screw for the purpose set forth.

2. In a sound reproducing box for disk talking machines, a box casing, a diaphragm

and its bearing parts in combination with a stylus-carrying arm composed of a steel-wire portion connected with the diaphragm and an aluminium-portion which are secured together, of a stylus held in place upon said aluminium-portion by an adjustable side-piece having a layer of tin and forced upon said stylus by a hand-screw for the purpose set forth.

- 10 3. In a sound reproducing box for disk-talking machines, a box casing, a diaphragm and its bearing parts in combination with a stylus-carrying arm composed of a steel-wire portion connected with the diaphragm and
15 an aluminium-portion which are secured together, of a stylus held in place upon said aluminium-portion by an adjustable side-piece having a layer of tin and forced upon said stylus by a hand-screw; an oblong ring

receiving the hand-screw and said adjustable side-piece and mounted upon a projection of said arm; an intermediate piece of brass inserted between said projection and said ring, for the purpose set forth. 20

4. In a sound reproducing box for disk-talking machines, a box casing, a diaphragm and its bearing parts, in combination with a stylus-carrying arm composed of a screw-threaded wire portion (*o*) and of a more solid part (*b*) secured together, of an adjustable
25 nut (*p*) placed upon said wire-portion for the purpose set forth. 30

In witness whereof I have hereunto set my hand in presence of two witnesses.

PAUL DE BEAUX.

Witnesses:

SOUTHARD P. WARNER,
RUDOLPH FRICKE.

H. JARDÉ.
SOUND BOX FOR TALKING MACHINES.
APPLICATION FILED NOV. 28, 1907.

917,076.

Patented Apr. 6, 1909.

Fig. 1.

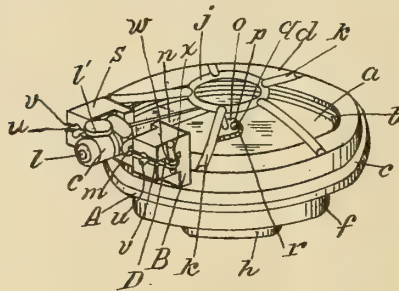


Fig. 2.

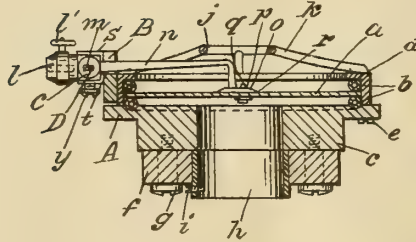


Fig. 4.

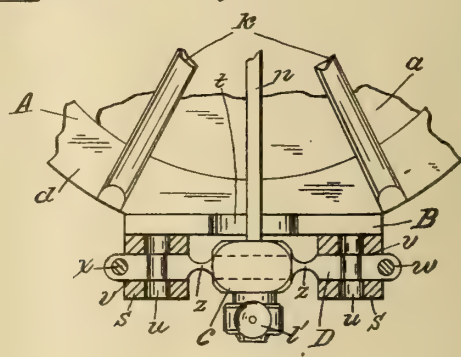
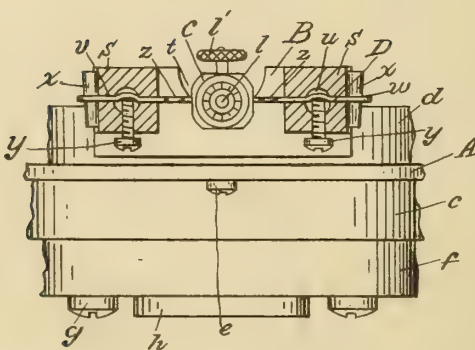


Fig. 3.



Witnesses:
M. L. Vickers
E. B. Yeaton

Henri Jardé
Inventor

By his Attorney
S. Char. Yeaton.

UNITED STATES PATENT OFFICE.

HENRI JARDÉ, OF NEW YORK, N. Y.

SOUND-BOX FOR TALKING-MACHINES.

No. 917,076.

Specification of Letters Patent.

Patented April 6, 1909.

Application filed November 26, 1907. Serial No. 403,974.

To all whom it may concern:

Be it known that I, HENRI JARDÉ, a citizen of France, and a resident of the United States, residing in the city of New York, borough of Manhattan, county and State of New York, have invented certain new and useful Improvements in Sound-Boxes for Talking-Machines, of which the following is a specification.

10 The object of my invention is the devising of suitable mechanism for retaining the needle arm in a sound-box of a talking machine whereby it is feasible to employ a diaphragm for the sound-box made from suitable card-board in place of the more expensive mica diaphragm commonly used. While my endeavors have been directed with this end in view, the construction which I employ is, however, capable of operating the needle-
20 arm in conjunction with a mica diaphragm also, but better results are obtainable with an inexpensive disk of card-board. In like manner the mechanisms employed in the several sound-boxes in common use may be used in conjunction with card-board diaphragms, but not with the good results realized when they are used with mica diaphragms. Briefly then, in the sound-boxes in common use attention has been directed
30 toward devising mechanisms for obtaining the best results when using mica diaphragms, and accordingly the mechanisms in use are best suitable in connection with mica diaphragms and with such diaphragms give the best results. The construction I employ is best suitable for ordinary cheap card-board diaphragms and with such diaphragms I obtain the best result. Not only is the card-board inexpensive as compared with the
40 mica, but it is also far more durable. Where mica is used care must be taken else the mica will be broken, especially if the sound-box is dropped, or otherwise encounters a severe blow. Attempts have previously been made
45 to use card-board, but as far as I am aware they have met with failure, which is evidenced by the fact that mica is universally used in practice.

Besides the advantages already mentioned, I claim for sound-boxes constructed according to my invention, and with the card-board diaphragm better results than obtainable from those now in use. When using my sound-box with a talking machine, much of the undesirable rasping and
55 metallic sounds are eliminated and the gen-

eral effect is softened and more melodious. The benefits derived from my invention are more marked and noticeable in some records than in others. For instance, where bass music, a trombone, flute or cornet are played with a clarinet, the sound of the clarinet is hardly discernible when a sound-box with mica is used; whereas my sound-box gives to each musical instrument its full value and the clarinet is distinctly heard. This is also true where bells are played in a piece of music with other instruments; the bells are heard with my sound-box even when softly played, whereas with the ordinary box they may not be heard at all. Also where a piano accompanies a singer, with the ordinary sound-box the notes of the piano may at times be entirely drowned by the singer, whereas in my box they will be heard.

The distinguishing novel feature in my reproducer or sound-box is in the employment of a thin strip of metal preferably of steel and in the manner of securing it to posts or lugs that extend from the sound-box for that purpose. Upon this strip is mounted the needle arm. The tension of the steel strip is adjustable and the part of the strip on either side of the needle arm and between the posts is reduced in cross-section. The needle arm is snugly fitted upon the strip, and the contracted portions of the strip each side of the arm act as resilient pivotal connections for the needle arm.

Referring to the drawings, Figure 1 is a perspective view of my complete sound-box. Fig. 2 is a vertical sectional view. Fig. 3 is a broken front view, partly a sectional view. Fig. 4 is a broken plan view, partly a sectional view.

The card-board diaphragm *a* is secured between rubber sections *b* and *c* within a casing *A* composed of a front portion *e* and a back portion secured in the body or back portion by screws *d*. Upon the back of the plate *c* is secured a large insulating cylinder by means of screws *g* and in this cylinder is connected a bushing *h* which is adapted to fit upon the end of the sound-conducting tube of the talking machine (which is not shown in the drawings). To properly position the sound-box to the end of the machine a screw projects in the bushing *h* and this screw is adapted to fit within a slot in the sound-conducting tube of the machine making a hermetic joint in working the sound-box to the machine. Such a sound-box as thus far de-

scribed is old and I do not lay any claim to it as my invention.

To guard the needle arm against accidental injury, I provide a guard preferably made of
5 a circular central portion *j* and radial arms *k* formed integral with the ring at one end and with the cap *d* at their other ends.

Referring to the manner of securing the needle arm:—A plate *B* is secured to the
10 periphery of the cap *d*. The plate is preferably made integral with the cap, or it may be brazed thereto, or if desired, it may be secured by screws. The plate extends above
15 the face of the cap to a suitable distance to facilitate an easy mounting of the needle arm *C*. In the forward end of the needle arm is a longitudinal bore or socket *l* for retaining the needle point, and a set screw *l'* is provided for securing the needle within the
20 socket. To the rear of the needle socket is a transverse slotted bore *m* for mounting the arm. The needle arm extends rearwardly forming the part *n*. This member *n* may be secured to the forward part of the arm *C* in
25 any suitable way, preferably it should be brazed in a hole formed to the rear of the transverse slot *m*. The part *n* of the needle arm tapers rearwardly and is bent downwardly near the end to meet the card-board
30 diaphragm at its center. Upon this end of the arm is a head *o* provided with a screw-threaded hole *p* for securing it to the card-board diaphragm by screw *q*. The joint is hermetically sealed with wax *r*.

Upon the ends of the plate *B* are formed
35 blocks *s—s*. The needle arm is positioned between these blocks, and the plate *B* is provided with slot *t* to permit the arm extending rearwardly. Bores *u—u* and slots *v—v*
40 are provided in the ends of the blocks *s—s*, or they may be formed in the upper or lower faces of the blocks instead. The two slots *v—v* must be in exact alinement. A thin strip of metal *D* (preferably steel) is snugly fitted
45 through the transverse slot *m* of the needle arm and the ends of the strip are passed through the slots *v—v*. The ends of the strip extend beyond the slots and are provided with holes *w—w* into which are inserted
50 tapering pins *x—x*. The blocks *s—s* are tapped for receiving the adjusting screws *y—y*. Suitable space is allowed between the needle arm and the blocks *s—s*, and reduced portions *z—z* are formed on the strip *D* extending through these spaces.

The steel strip is cut away on both sides to leave the reduced parts or thin ribs of metal
55 *z—z*, which act in the manner of pivotal spring connections. The cut-out portions to form the ribs *z—z* are rounding, leaving, proportionately, large fillets to strengthen the thin ribs. The adjusting screws *y—y* have their ends extending into the end bores *u—u* and abut against the metal strip *D* which
60 passes through these bores. By adjusting

these screws, the strip *D* may be brought to the proper tension, as is needed to produce the best results from the sound-box. Such a mounting of the needle arm is very delicate,
70 on account of the spring pivotal like contracted portions *z—z* on the strip *D* and is capable of very fine tensional adjustment by the screws *y—y*.

The posts or blocks *s—s* are made sufficiently large to form a protection for that
75 part of the needle arm and the contracted parts *z—z* of the strip *D* between them. The parts are proportioned to allow the needle arm *n* to just clear the face of the cap *d* and the part of the arm through which the
80 strip *D* passes to just clear the plate *B*. Such a construction amply protects the parts *z—z* of the strip *D* against rupture, should the box be accidentally dropped. In such a case the needle arm would almost invariably
85 strike against the cap *d*, and the resiliency of the parts *z—z* of the strip *D* are sufficient to permit of such a small displacement without rupture. The radial arms *k* and central
90 part *j* protect the inner end of the needle arm against accidental blows. I have tested my sound-box in this respect by throwing it along the floor across the room, without in
95 any way injuring it. I have also subjected it to such blows that were mica used for the diaphragm it would inevitably be broken.

By mounting the needle arm on such delicate pivotal connections under a state of strain the slightest movement of the needle point will be transmitted to the diaphragm,
100 and it is doubtless on account of this delicate construction that my sound-box is capable of reproducing many sound undulations where other sound-boxes fail.

I have thus far received the best results
105 from using diaphragms made from pressed paper board, having a calendered or glossy appearance and of a thickness of about 15/1000 of an inch. Where the board used is much thicker the sound produced is dulled
110 and where thin board is used a high pitched or screechy tone is apparent, therefore care must be taken that a board of the proper thickness be selected.

I claim as my invention—

1. In a sound-box for a talking machine,
115 mechanism for securing the needle arm in position comprising a flat strip of metal upon which the needle arm is snugly mounted, a post secured in fixed position on either side
120 of the said arm, a slot in each post for receiving the ends of said strip, end portions of said strip having holes extending beyond the posts, tapering pins extending in the holes to retain the arm in transverse central position,
125 and to keep the metal strip taut and a screw tapped in each post having its end abutting against the strip, to regulate the tension thereof, and to adjust the arm to transverse central position.

2. In a sound-box for a talking machine, mechanism for securing the needle arm in position comprising a flat strip of metal upon which the needle arm is snugly mounted, a
 5 post secured in fixed position on either side of the said arm, a slot in each post in a horizontal plane for retaining the ends of said strip, said slots being of greater width than the strip for longitudinal positioning of the
 10 arm, end portions of said strip having holes extending beyond the posts, tapering pins extending in the holes to retain the arm in transverse central position and to retain the
 15 metal strip taut, and a screw tapped in each post having its end abutting against the strip to regulate the tension thereof, and to adjust the arm to transverse central position.

3. In a sound-box for a talking machine, mechanism for securing the needle arm in position comprising a flat strip of metal upon which the needle arm is snugly mounted, a
 20 post secured in fixed position on either side of the said arm, an open slot in each post in a horizontal plane for retaining the ends of said strip and for longitudinal positioning of the
 25 arm and to facilitate an easy insertion and withdrawal of the strip when assembled with the arm, end portions of said strip having holes extending beyond the posts, tapering
 30 pins extending in the holes to retain the arm in transverse central position and to retain

the metal strip taut, and a screw tapped in each post having its end abutting against the strip to regulate the tension thereof and to adjust the arm to transverse central position.

4. In a sound-box for a talking machine, mechanism for securing the needle arm in position comprising a flat strip of metal upon which the needle arm is mounted, a post secured in fixed position on either side of the
 said arm, an open slot in each post in a horizontal plane for retaining the ends of said strip and for longitudinal positioning of the arm and to facilitate an easy insertion and withdrawal of the strip when assembled with the arm, end portions of said strip having
 holes extending beyond the posts, tapering pins extending in the holes, to retain the arm in transverse central position and to retain the metal strip taut, enlarged recesses formed in the walls of the slots, screws tapped in the
 posts having their ends abutting against the strip opposite the recesses to force the strip into the recesses when screwed inward to adjust the tension of the strip and to adjust the arm to transverse central position, and contracted portions formed on the strip between the arm and posts.

HENRI JARDÉ.

Witnesses:

ALEXANDRE SELMER,
 EDGAR BRAILLY.

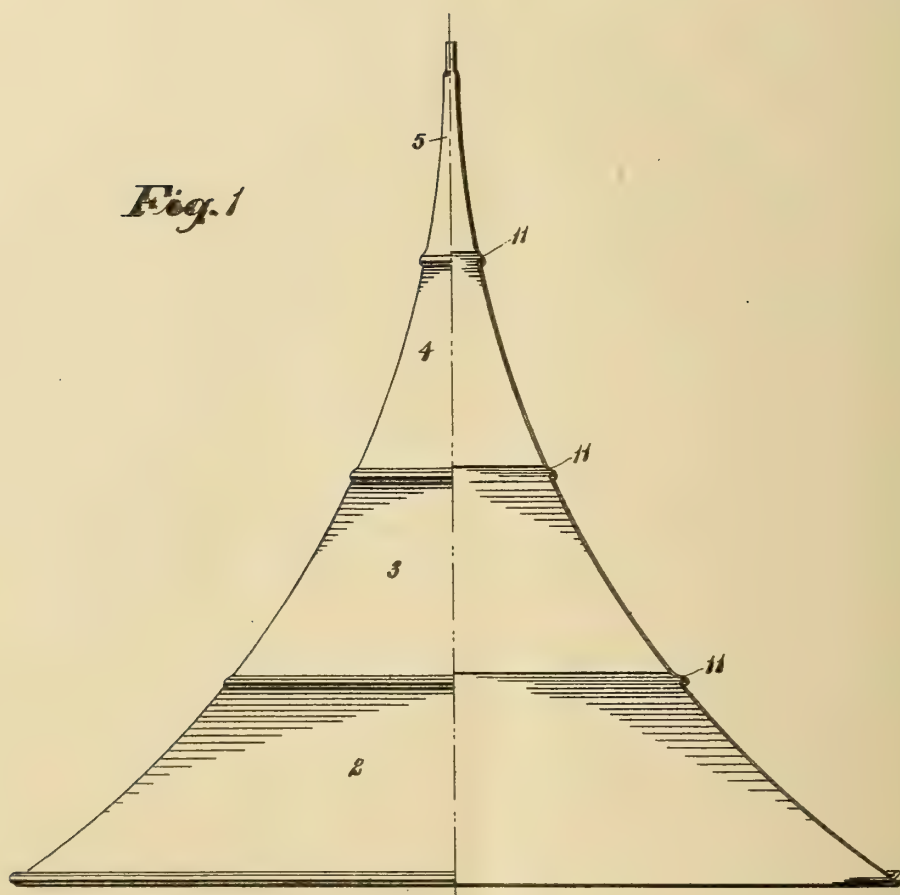


J. H. B. CONGER.
AMPLIFYING HORN.
APPLICATION FILED MAY 4, 1906.

917,252.

Patented Apr. 6, 1909.
3 SHEETS—SHEET 1.

Fig. 1



WITNESSES:
Friedrich Hermann
Ethel B Reed

INVENTOR
JOHN H. B. CONGER.
BY
Russell M. Everett
ATTORNEY

J. H. B. CONGER.
AMPLIFYING HORN.
APPLICATION FILED MAY 4, 1906.

917,252.

Patented Apr. 6, 1909.
3 SHEETS—SHEET 2.

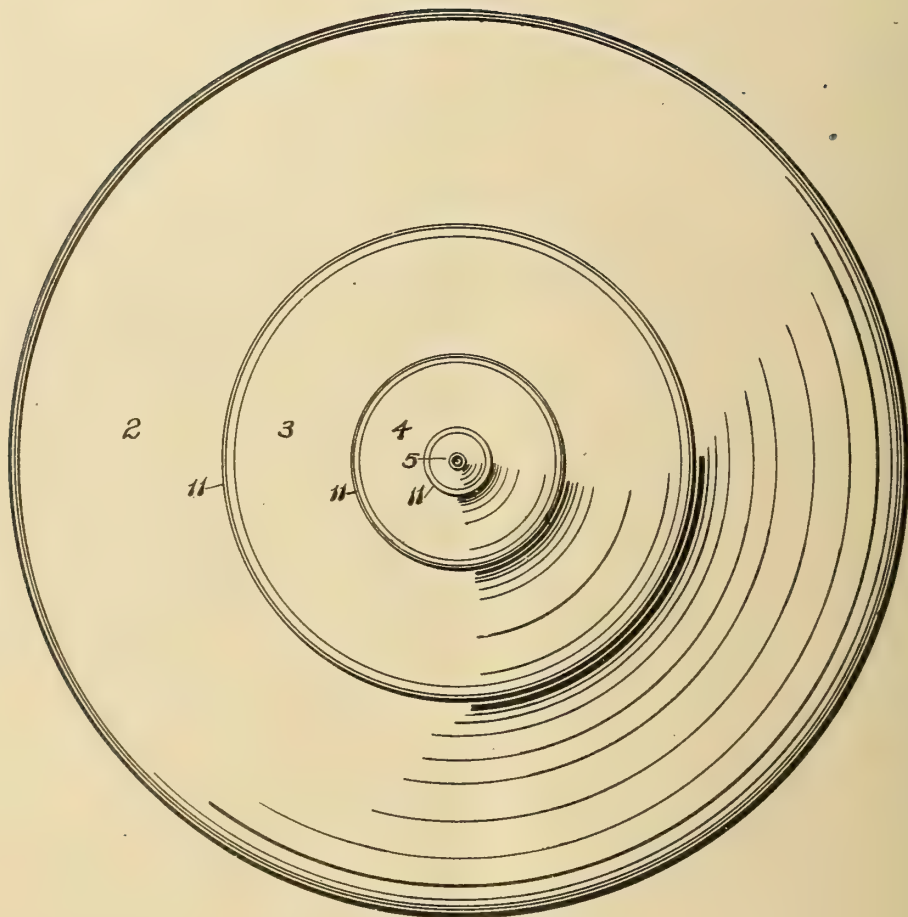


Fig. 2

WITNESSES:
Fredrick Germania Jr.

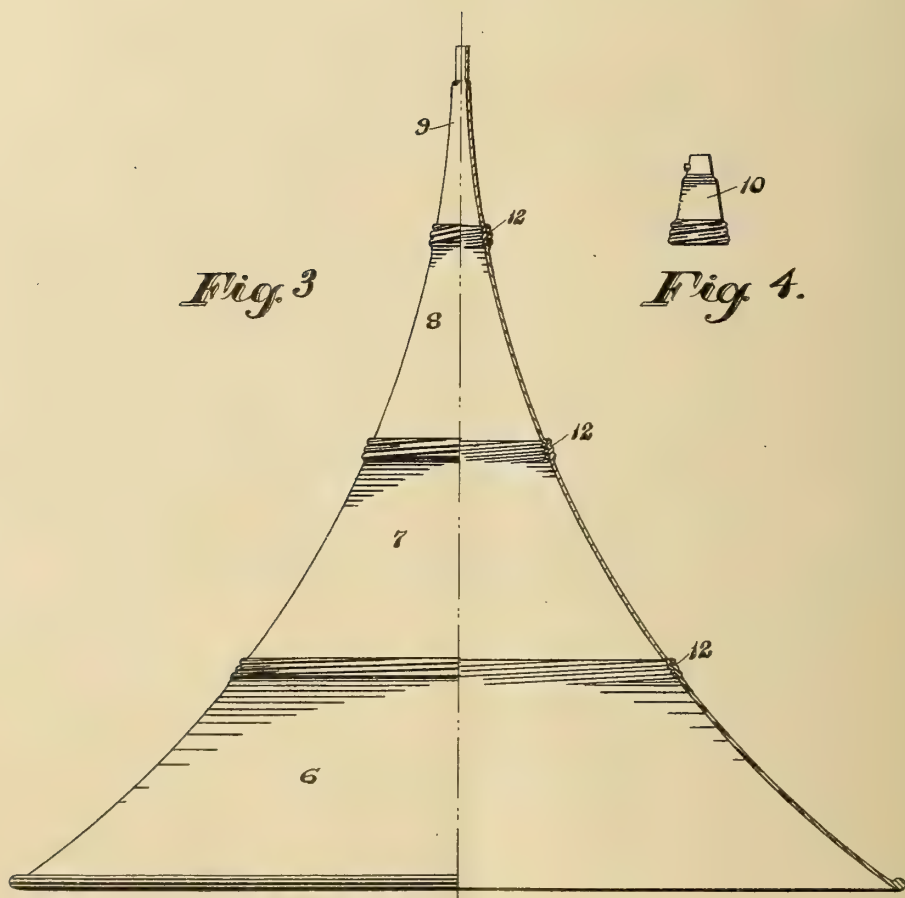
Ethel B Reed

INVENTOR
JOHN H. B. CONGER.
BY
Russell M. Overett
ATTORNEY

J. H. B. CONGER.
AMPLIFYING HORN.
APPLICATION FILED MAY 4, 1906.

917,252.

Patented Apr. 6, 1909.
3 SHEETS—SHEET 3.



WITNESSES:

Fredrick G. ...

Ethel B. Reed

INVENTOR

JOHN H. B. CONGER

BY

Russell M. Everett
ATTORNEY

UNITED STATES PATENT OFFICE.

JOHN H. B. CONGER, OF NEWARK, NEW JERSEY, ASSIGNOR TO THE TEA TRAY COMPANY OF NEWARK, N. J., A CORPORATION OF NEW JERSEY.

AMPLIFYING-HORN.

No. 917,252.

Specification of Letters Patent.

Patented April 6, 1909.

Application filed May 4, 1906. Serial No. 315,227.

To all whom it may concern:

Be it known that I, JOHN H. B. CONGER, a citizen of the United States, residing at Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Amplifying-Horns, of which the following is a specification.

The objects of this invention are to provide an amplifying horn flaring upon curved lines which shall be composed of transverse sections, each comprising a seamless or circumferentially integral band; to thus reduce the number of parts or pieces in such a horn and secure fewer seams; to enable a horn flaring on curved lines to be made collapsible; to provide interchangeable sections for the small end of the horn so that the main body of the horn can be used for different talking machines, and to secure other advantages and results as may be brought out in the following description.

Referring to the accompanying drawings, in which like numerals of reference indicate corresponding parts in each of the several figures, Figure 1 is a side elevation, partly in central vertical section, of a horn of my improved construction; Fig. 2 is a plan of the same; Fig. 3 is a view similar to Fig. 1 except that the horn sections are shown detachably united, and Fig. 4 shows a small end section adapted to replace the one shown in Fig. 3 for certain kinds of talking machines.

It will be understood that horns of the type to which my present invention relates, that is, horns which flare upon curved lines, morning-glory or flower horns as they are commonly called,—have heretofore been made of a large number of longitudinal sections or strips, since it obviously was impossible to form of one or two pieces a horn or horn section which flared upon other than straight lines. The result of this construction has been a multiplicity of seams or joints in the horn, which not only marred its appearance but also interfered with its acoustic properties.

My purpose is to do away with all these objectionable features and provide a horn flaring upon curved lines which shall have a minimum number of joints or seams. To this end the horn is constructed of a longitudinal series of transverse sections each of which is composed of a seamless integral band which has been pressed, stamped or

span into its proper form, to wit, a flaring shape in which the lateral lines are curved. In Figs. 1 and 2 of the drawings I have shown such sections 2, 3, 4, etc., which are connected at their adjacent edges, as at 11, by reaming or any other means known to the art to afford a permanent connection. A horn is thus provided which flares continuously on curved lines and yet is composed of a small number of pieces and has a still less number of seams.

Obviously, the degree of curvature of the sides of the horn may be varied, and the length of the sections changed at will, without departing from the spirit and scope of the invention.

In Fig. 4 of the drawing I have shown sections 6, 7, 8, etc., of the horn detachably connected, as by screwing together at their adjacent ends, as at 12, although any other appropriate means of coupling together could be employed if desired. Furthermore, the larger end of each section screws inside of the smaller end of the next adjacent section, as shown in the drawings, so that when the sections are screwed apart the horn will collapse and nest its sections one within another.

One advantage of the construction shown in Fig. 3, is that in manufacturing, different small end sections may be employed with the rest of the horn to accommodate it to different conditions, makes of machines, and so forth. For instance, the end section 9 shown in Fig. 3 is adapted to the use of the horn upon phonographs, while in Fig. 4 I have shown another end section 10 which is adapted to replace the end section 9 and enable the horn to be applied to gramophones. It will thus be understood that by having a judicious assortment of small end sections, the number of horn bodies carried in stock could be greatly reduced, since they would be available for different purposes.

Having thus described the invention what I claim as new is:

The horn-like curved horn, composed of a plurality of transverse sections adapted to be connected end to end, each section comprising a seamless band and having its walls flaring on curved lines.

JOHN H. B. CONGER

Witness:

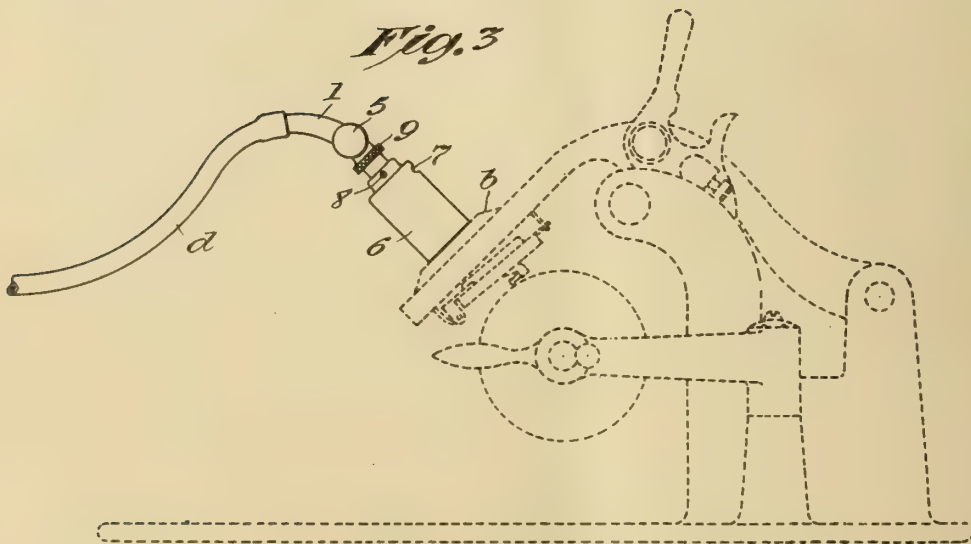
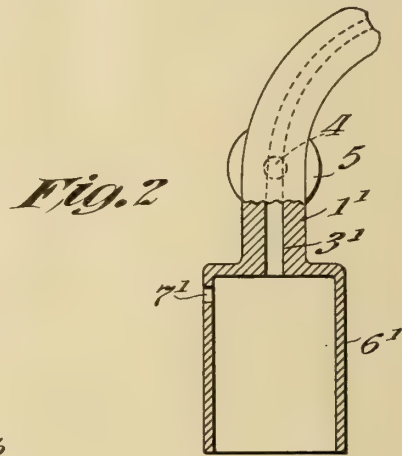
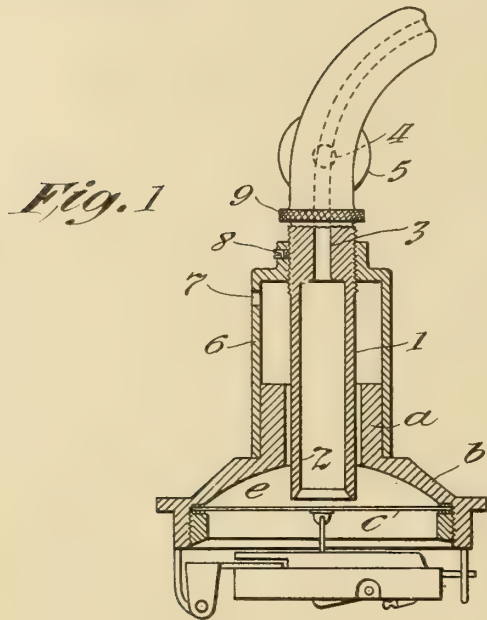
RUSSELL M. FURBER,

ETHEL B. REED.

A. N. PIERMAN.
SOUND MODIFIER.
APPLICATION FILED SEPT. 13, 1906.

917,654.

Patented Apr. 6, 1909.



Witnesses:
Frank D. Lewis
Delos Holden

Inventor:
Alexander A. Pierman
by Frank E. Green
Atty.

UNITED STATES PATENT OFFICE.

ALEXANDER N. PIERMAN, OF NEWARK, NEW JERSEY, ASSIGNOR TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

SOUND-MODIFIER.

No. 917,654.

Specification of Letters Patent.

Patented April 6, 1909.

Application filed September 13, 1906. Serial No. 334,441.

To all whom it may concern:

Be it known that I, ALEXANDER N. PIERMAN, a citizen of the United States, residing at Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Sound-Modi-
5 fiers, of which the following is a description.

My invention has for its object the provision of means for eliminating harsh or disagreeable sounds which sometimes accom-
10 pany phonographic reproduction and which are particularly unpleasant when the sounds are received by the hearer through ear tubes, as for example, in the ordinary use of the
15 phonograph for commercial purposes. It appears that the tones which are produced by the central portion of the diaphragm of the reproducer are purer in quality and freer from vibrations which produce the
20 harsh sounds above referred to, than those which emanate from other portions of the diaphragm, and it is therefore my object more particularly to provide means whereby the vibrations from the center of the dia-
25 phragm are transmitted to the hearer while the vibrations from other portions of the diaphragm are largely if not entirely eliminated.

My invention also includes means for vary-
30 ing or regulating the strength or volume of the sounds produced whereby an adjustment may be secured to adapt the reproduction to the ear of any particular listener.

With these ends in view my invention con-
35 sists in the features hereinafter described and claimed.

Reference is hereby made to the accom-
panying drawing of which

Figure 1 is a side elevation, partly in
40 axial section, of a phonograph reproducer with one form of my invention applied thereto; Fig. 2 is a side elevation, partly in section, of a modification of my invention; Fig. 3 is a side elevation showing in dotted
45 lines a phonograph of the Edison Commercial type with the device of Fig. 1 applied thereto and provided with a flexible ear tube.

In all views corresponding parts are design-
50 nated by the same reference numerals.

The improved sound modifier comprises preferably a tube 1 of a diameter sufficiently small to enable it to pass through the neck *a* of the phonograph reproducer *b*, with suffi-

cient clearance, as shown in Fig. 1, to per-
55 mit the free passage of sound waves around the same. The lower end of the tube 1 should preferably extend close to the central portion of the diaphragm *c* and such end may be chamfered as shown in order to
60 somewhat increase the area of the opening of the bore 2. The upper end of the tube 1 is provided with a bore 3 of smaller diameter than the bore 2 and communicating therewith. Threaded across the bore 3 so
65 as to form a valve for regulating the area through which the sound waves must pass to the listener, is a screw 4 having a head 5 by which it may be readily turned by the user. The upper end of the tube 1 is pref-
70 erably curved forward as shown for convenience in attaching the flexible listening tube *d*. The tube 1 may be supported in its operative position by any suitable means, preferably means which will allow the same
75 to be readily applied to and disengaged from the phonograph reproducer. The means shown consists of a cup shaped member 6 of such size as to fit snugly upon the neck *a* of the reproducer *b*. The cup 6 is
80 provided with an aperture 7 to permit the escape of sound waves which pass from the resonating chamber *e* around the tube 1 to the interior of the cup 6, or at any rate to prevent acoustic disturbances which might
85 exist in case the chamber of the cup 6 were without an outlet.

In order to provide an adjustment where-
by the tube 1 may be secured in proper rela-
90 tion to the diaphragm *c* in reproducers of somewhat different form, the tube 1 is threaded within the upper end of the cup 6 as shown, being held in any desired position
95 by set screw 8, and the tube 1 may be provided with a milled collar 9 to enable the same to be readily turned when it is desired to adjust the same.

In operating the device, the operator merely applies the same to the phono-
100 graphic reproducer by passing the tube 1 through the neck *a* so that the lower edge of the cup 6 rests upon the body of the reproducer. The tube 1 may then be adjusted if it is considered desirable with respect to the
105 cup 6, so as to bring the lower end of the tube 1 to the most desirable distance from the diaphragm *c*, said tube being then secured by the set screw 8. The ear tube 6 is

then applied to the end of the tube 1 and the volume of sound regulated by the screw 4.

In the device of Fig. 2 a cup 6' is provided with an opening 7' and is adapted to fit upon the neck *a* of the reproducer in the same way as the cup 6 previously described. The upper end of the cup 6' is provided with an extension 1' having a bore 3' which communicates with the interior of the cup 6'. The screw 4 having a head 5 is threaded across the bore 3' so as to act as a regulating valve. In this form of device the elimination of objectionable sounds takes place to a considerable extent on account of the opening 7' allowing the escape thereof, although not to so great an extent as in the use of the device of Fig. 1.

Having now described my invention, what I claim as new and desire to secure by Letters Patent is as follows:

1. A phonograph reproducer comprising a hollow body and a tubular neck leading to the interior thereof, and a tube passing through said neck, said neck having a passage from the interior of said body to the atmosphere exteriorly of said tube, substantially as set forth.

2. As a new article of manufacture, a sound modifier comprising a tube of a diameter sufficiently small to permit it to pass through the neck of a phonograph reproducer, and a supporting cup adapted to telescope upon said neck, substantially as set forth.

3. As a new article of manufacture, a sound modifier comprising a tube of a diameter sufficiently small to permit it to pass through the neck of a phonograph reproducer, and a supporting cup adapted to telescope upon said neck, said cup having an opening extending through the body thereof, substantially as set forth.

4. As a new article of manufacture, a sound modifier comprising a tube and a support adjustably applied directly to the exterior thereof, substantially as set forth.

5. As a new article of manufacture, a sound modifier comprising a tube and a support threaded upon the said tube, substantially as set forth.

6. A sound modifier comprising a tube and a hollow cylindrical support concentric therewith and secured directly thereto, substantially as set forth.

7. A sound modifier comprising a tube and an apertured cup concentrically secured thereto, substantially as set forth.

8. A sound modifier comprising a tube and a cup threaded on the exterior thereof, substantially as set forth.

9. In a phonograph, the combination of a diaphragm and diaphragm support com-

prising a resonating chamber, and a sound conveying tube extending through said resonating chamber into proximity with the diaphragm, said resonating chamber communicating with the atmosphere by an opening or passage exterior to the said tube, substantially as set forth.

10. A sound modifier comprising a cup adapted to be applied to a phonograph reproducer and having an aperture through the body thereof and a tube having a bore for conducting the sound waves and carried by said cup, substantially as set forth.

11. A sound modifier comprising a tube having a sound conducting bore, a valve for regulating the extent of opening of said bore, and a cup supporting said tube and adapted to be applied to a phonograph reproducer, said cup having an aperture through the body thereof, substantially as set forth.

12. A phonograph reproducer comprising a hollow body and a tubular neck leading to the interior thereof, a diaphragm, and a tube passing through said neck into proximity to the central portion of the diaphragm, said neck having a passage from the interior of said body to the atmosphere exteriorly of said tube, substantially as set forth.

13. A sound box comprising rear and side walls, a diaphragm therein, a sound box tube projecting from said rear wall, a sound modifying tube movable within said sound box tube and means for adjusting said sound box tube into and out of close proximity to said diaphragm, substantially as set forth.

14. A sound box comprising rear and side walls, a diaphragm therein, a sound box tube projecting from said rear wall and a sound modifying tube movable within said sound box tube, and means exterior to said sound box for adjusting said sound modifying tube into and out of close proximity to said diaphragm, substantially as set forth.

15. A sound box comprising side walls and a rear wall having an opening therein, a diaphragm in said sound box, a sound box tube projecting from said rear wall and surrounding said opening, a sound modifying tube movable within said sound box tube and extending through the opening in the rear wall of the sound box and means for adjusting the sound modifying tube into and out of proximity to the diaphragm.

This specification signed and witnessed this 10th day of September 1906.

ALEXANDER N. PIERMAN.

Witnesses:

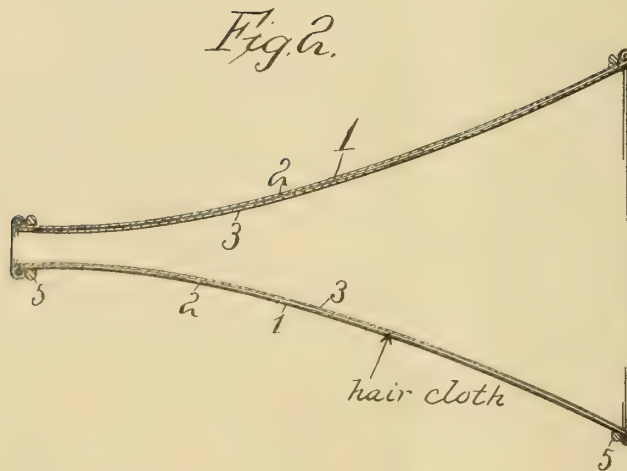
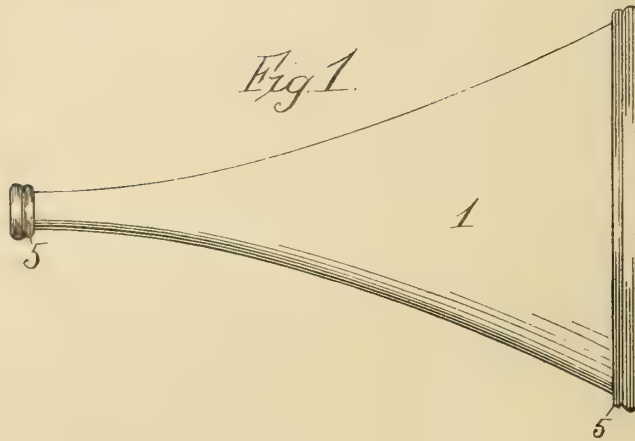
DELOS HOLDEN,

MARY J. LAIDLAW.

G. BENJAMIN & W. HANDLEY.
 PHONOGRAPH HORN.
 APPLICATION FILED AUG. 22, 1908.

917,404.

Patented Apr. 6, 1909.
 2 SHEETS—SHEET 1.



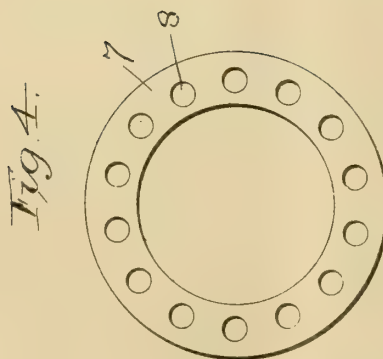
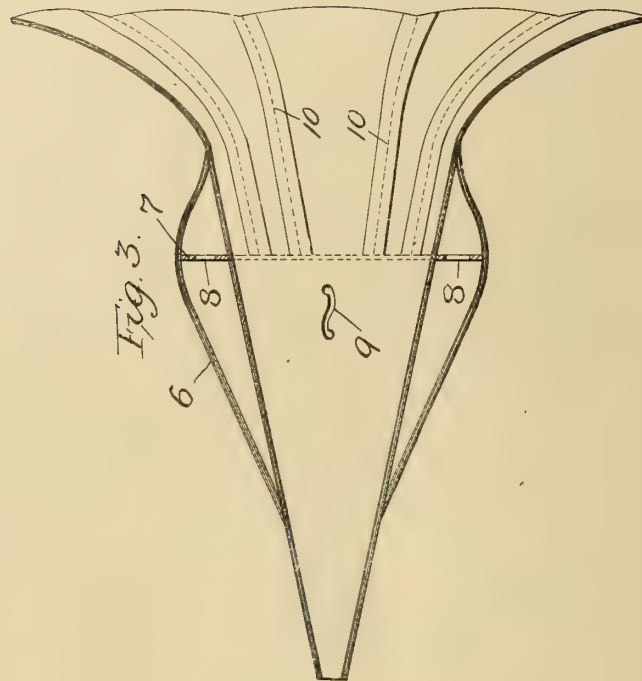
Attest.
 Bent, McLaughlin
 Edward N. Santo

Inventors:-
 George Benjamin
 William Handley
 by Spear, Middleton, Dinsmore & Spear
 Attys

G. BENJAMIN & W. HANDLEY.
 PHONOGRAPH HORN.
 APPLICATION FILED AUG. 22, 1908.

917,404.

Patented Apr. 6, 1909.
 2 SHEETS—SHEET 2.



Attest.
Bent M. Stahl
 Edward N. Sarton

Inventors:-
 George Benjamin
 William Handley
 by *Spear, Middleton, Donarson & Lee*
 Attys.

UNITED STATES PATENT OFFICE.

GEORGE BENJAMIN, OF PHILADELPHIA, PENNSYLVANIA, AND WILLIAM HANDLEY, OF CAMDEN, NEW JERSEY.

PHONOGRAPH-HORN.

No. 917,404.

Specification of Letters Patent.

Patented April 6, 1909.

Application filed August 22, 1908. Serial No. 449,808.

To all whom it may concern:

Be it known that we, GEORGE BENJAMIN and WILLIAM HANDLEY, citizens of the United States, residing at Philadelphia, Pennsylvania, and Camden, New Jersey, respectively, have invented certain new and useful Improvements in Phonograph-Horns, of which the following is a specification.

Our invention relates to the production of a horn for use in graphophones or phonographs and is designed especially to overcome the serious objection of the metallic sound common to many horns; to provide a horn very light in weight and at the same time very durable.

In the accompanying drawing is shown in Figure 1 a side view, and in Fig. 2 a sectional view of a horn made in accordance with our invention. Fig. 3 represents a sectional view of a horn having a sound box. Fig. 4 is a detail view of the bridge.

We have found that it is exceedingly difficult to produce a horn which will not interfere in any way with the sound produced by the machine and we have aimed to avoid the metallic or screeching sound common to metallic horns and to also prevent the absorption or flattening of the sound as when any form of wood is used and in our experiments we have discovered that the use of horse hair produces the most perfect tones, provided it is arranged with the strands of horse hair longitudinally of the horn.

In carrying out our invention we utilize an outer lining for the horn, which may be paper as shown at 1, or this may be of silk to give a finish to the exterior of the horn, or we may use silk over the paper, but in all cases the paper is thin for the sake of lightness. Next to the paper or silk exterior, we place the horse hair layer, the strands of the horse hair extending longitudinally of the horn and then in order to protect the horse hair from abrasion we place over it a layer of thin paper, muslin or silk so that while protection may be given to the horse hair layer, the benefit derived from the horse hair or horse hair cloth will not be lost. The end of the horn may be stiffened by a metallic rim as shown at 5. The hair cloth layer is indicated at 2 and the inner layer of paper, silk or muslin at 3. We have found that the hair cloth lining or layer is non-absorbent and does not tend to flatten the sounds, but has a tendency to carry them and to deliver them as they issue from the machine in per-

fect tones. We believe that strands made of artificial substances, such as cat-gut, would answer partially the same purpose, but it would be too expensive to be used and since we find in the hair cloth a material perfectly answering the purpose and having the merit of economy, as well.

We also provide a sound box in conjunction with the horn formed as described to increase the volume and purity of tone, this consisting, as shown in Fig. 3 of an outer wall 6 made up of the layers of paper and horse hair, or hair cloth, this wall being laid over a bridge 7, the inner edge of which rests upon the wall of the horn proper. This bridge is preferably of annular form having openings at 8. In front of this bridge and toward the small end of the horn we provide openings 9 through the wall of the horn through which the interior of the sound box or chamber communicates with the interior of the horn for the emission of the sound. These openings are preferably of S shape, similar to those employed adjacent the bridge in a violin, and in fact our sound box produces, in a measure, a violin effect in softening the tones and increasing the volume thereof, the horse hair strings being laid over the bridge and being vibrated by the sound waves to give the desired effect. We do not limit ourselves to the form of bridge or shape of the sound box.

We prefer to build up our horn of a series of tapered strips of material the general form of which is shown in Fig. 5 between the dotted lines 10. The strips of paper and of horse hair cloth are each of this form, i. e. tapered to conform to the flare of the horn, and when superimposed they are held together by uniting strips of paper or other material pasted or cemented over the joints of the tapered layers as indicated at 11.

It will be understood that the inner and outer layers are separated from each other by the interposed hair cloth, and the interstices of this hair cloth are free, that is to say, the hair cloth is not embedded in any body or holding material.

What we claim is:

1. A graphophone horn composed of a plurality of separate layers of material, including a layer of hair cloth, said hair cloth having its interstices free, substantially as described.

2. A graphophone horn composed of a plurality of layers of material, including an

outer finishing layer, an inner layer and an interposed layer of hair cloth, said layers of material being separate, and the hair cloth having its interstices free, substantially as described.

3. A graphophone horn composed of layers of material, including a layer of hair cloth laid against the other layer and having its interstices free, the strands of hair running longitudinally or lengthwise of the horn, substantially as described.

4. A graphophone horn having a chamber surrounding the main wall of the horn, with an opening leading into the interior of the horn and closed throughout its outer wall, substantially as described.

5. A phonograph horn having a bridge surrounding its main wall and a chamber surrounding the main wall of the horn, with its outer wall extending over the bridge, substantially as described.

6. A phonograph horn having a chamber surrounding its main wall and with a bridge

therein surrounding the said main wall, with hair cloth extending over the bridge and forming a part of the outer wall, substantially as described.

7. A phonograph horn having a chamber extending around its main wall, said main wall and the outer wall of said chamber each having a layer of hair cloth therein, and an interposed bridge, substantially as described.

8. A phonograph horn composed of inner and outer layers of material separated by a layer of hair cloth.

9. A phonograph horn composed of inner and outer layers of material separated by a layer of hair cloth in which the strands of hair cloth run lengthwise of the horn.

In testimony whereof, we affix our signatures in presence of two witnesses.

GEORGE BENJAMIN.
WILLIAM HANDLEY.

Witnesses:

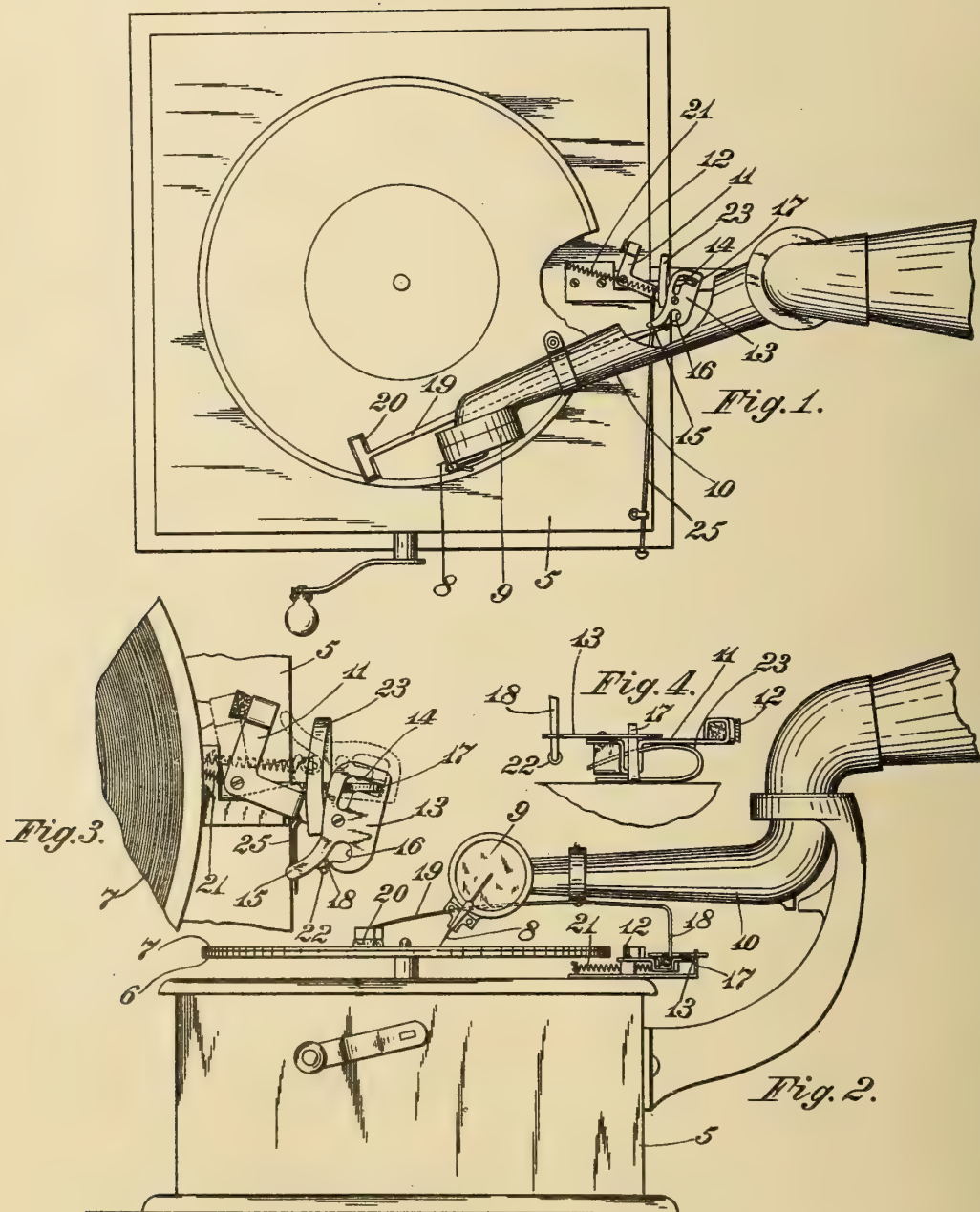
JAMES R. ANDERSON,
LOUIS D. CASNER.

H. F. PELTIER.
GRAMOPHONE.

APPLICATION FILED MAY 25, 1908.

917,790.

Patented Apr. 13, 1909.



Witnesses
Ray. Fuchel
John C. Blue

Inventor
Henry F. Peltier
by Francis F. Peltier
his Attorneys

UNITED STATES PATENT OFFICE.

HENRY F. PELTIER, OF COLUMBUS, OHIO.

GRAMOPHONE.

No. 917,790.

Specification of Letters Patent.

Patented April 13, 1909.

Application filed May 25, 1908. Serial No. 434,758.

To all whom it may concern:

Be it known that I, HENRY F. PELTIER, a citizen of the United States, residing at Columbus, in the county of Franklin and State of Ohio, have invented a certain new and useful Improvement in Gramophones, of which the following is a specification.

The chief objects of this invention are first to provide an improved brake for stopping the record upon the completion of the reproduction and second to provide means for automatically cleaning the record during the reproducing operation.

The invention consists in the details of construction and combinations of parts hereinafter set forth and pointed out in the appended claims.

In the accompanying drawings—Figure 1 is a plan view with parts broken out; Fig. 2 is a side elevation; Fig. 3 is a detail in plan of the braking mechanism on a larger scale than exhibited in Fig. 1; Fig. 4 is a detail in elevation looking to the left Fig. 3.

In the views 5 designates the casing containing a suitable motor for rotating the turn table 6.

The character 7 designates the ordinary record disk which is removably secured and has on its surface the usual spirally-impressed grooves adapted to be engaged by the stylus point 8 of the reproducer 9, the latter being carried by the usual swinging supporting arm 10. When the record is turned the stylus is carried from the margin inward toward the center of the disk as usual.

Pivoted on the top of the casing is the brake lever 11 having on one arm a shoe 12 moving in the plane of the disk and table and toward and from their peripheries. Pivoted on the other arm of the lever 11 is a controller member 13 having at one end a curved slot 14 and at the other a curved finger 15 adjacent the root of which in the said member is a round opening 16. The curved slot 14 is engaged by an upwardly extending stationary finger 17 secured by its shank to the upper side of the casing 5. Secured to the under side of the swinging supporting arm 10 is an arm, one portion 18 of which is bent down to engage the curved finger 15, and in the braking operation to enter the round opening 16. The other por-

tion 19 of said arm carries a brush or wiper 20 that bears on the reproducer disk.

21 designates a coil spring secured to the outer arm of the brake lever and to a suitable device fixed on the casing 5. The spring 21 is arranged so as to operate to hold the shoe away from the turn table in the initial part of the operation of the disk and to draw said shoe toward the turn table when the lever has been shifted as herein-after set forth.

22 designates a small roller on the lower extremity of the portion 18 below the point where said portion acts on the curved finger 15. The character 23 designates an inclined finger secured on the casing 5 onto which said roller 22 rides when the reproducing operation is terminating, said inclined surface acting to elevate the arm 10 thus lifting the stylus off the disk.

As the arm 10 is carried inward by the action of the spiral groove in the disk on the stylus the end 18 acts on the curved finger 15 of the controller member 13 but for some time without moving the brake lever because of the curved slot 14. Shortly before the completion of the reproducing operation, however, the outer arm of the brake lever is carried by the action of the arm portion 18 on the controller to a position where the coil spring 21 operates to throw the brake shoe against the disk and turn table thereby stopping the rotation of said disk and table. This shifting of the action of the spring is arranged to take place at the moment shortly before the completion of the reproducing operation. The hook-like character of the controller at the opening 16 at the root of the finger 15 under the action of the spring 16 in turn acts on the portion 18 and adding to the momentum of the supporting arm 10 causes said arm to be elevated by the inclined finger 23 when the roller 22 on the portion 18 arrives at said finger. The hook like character of the controller at the root of the finger 15 permits the controller and brake to be restored to normal position by the portion 18 after the supporting arm 10 is swung to its initial position. The brake is thus operated at such slight expenditure of power as not to interfere with the perfect operation of the disk and reproducing devices. The brush or

wiper 20 automatically removes particles of dust from the disk and insures the perfect operation of the spiral groove on the stylus.

Attached to the brake lever is a rod 25 by which it can be shifted when desired.

What I claim is:

1. In a gramophone, the combination with a casing, a turn table thereon, and a vertically pivoted reproducer supporting arm, a brake mechanism, an arm member 18 fixed on the reproducer supporting arm to operate the brake mechanism, a stationary incline finger 23 on the casing to act on the member 18 to lift the reproducer supporting arm contemporaneously with the operation of the brake mechanism to stop the rotation of the turn table.

2. In a brake for gramophones, the combination with a casing, a turn table thereon and a reproducer supporting arm, of the brake lever and shoe, a spring in connection therewith adapted to hold the shoe toward or from the turn table according to the position of the lever, a controller device pivoted on said lever, a fixed finger operating to guide said controller, and means in connection with the reproducer supporting arm to act on said controller to shift the brake shoe toward and from the turn table, substantially as described.

HENRY F. PELTIER.

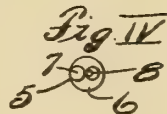
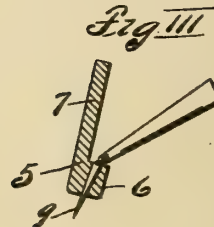
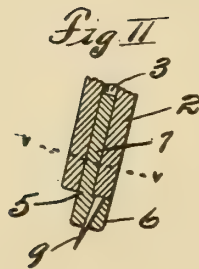
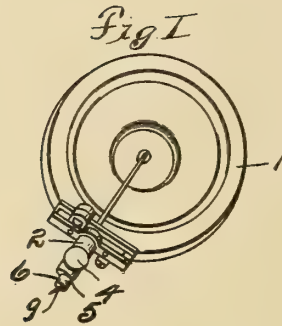
Witnesses:

BENJAMIN FINCKEL,
GEO. M. FINNERT.

W. B. CLAPLIN.
 NEEDLE HOLDER FOR TALKING MACHINES.
 APPLICATION FILED MAR. 20, 1908.

917,925.

Patented Apr. 13, 1909.



WITNESSES:

R. Hamilton
Harold C. Richards

INVENTOR.

W. B. Claplin
 BY *Arthur C. Brown*
 ATTORNEY.

UNITED STATES PATENT OFFICE.

WILBUR B. CLAFLIN, OF KANSAS CITY, MISSOURI.

NEEDLE-HOLDER FOR TALKING-MACHINES.

No. 917,925.

Specification of Letters Patent.

Patented April 13, 1909.

Application filed March 20, 1908. Serial No. 422,227.

To all whom it may concern:

Be it known that I, WILBUR B. CLAFLIN, a citizen of the United States, residing at Kansas City, in the county of Jackson and State of Missouri, have invented new and useful Improvements in Needle-Holders for Talking-Machines; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the figures of reference marked thereon, which form a part of this specification.

My invention relates to a needle holder for talking machines and more particularly to a device for holding thorn needles or points for use with such machines.

The needle ordinarily used for this purpose is composed of a metal body having a sharp point and a blunt shank, the latter being held in a socket in a bracket carried by the sound box by means of a set screw, which screw is carried by the bracket and tightened against the needle shank.

While the use of a thorn or wooden needle is well known, it has been found difficult to carry such needles in a manner to secure the best results therefrom, owing to the fact that when attached to the sound box in the usual manner, the pith in the portion of the thorn against which the set screw impinges, allows the thorn shell to give inwardly when pressed by the set screw, thereby causing the needle to loosen and mar the tone of the machine.

It is the object of my invention to provide a device for holding such needles so as to obviate the loosening noted and thereby secure a full rich tone therefrom, and in accomplishing this I have provided the improved details of structure which will presently be more fully described and pointed out in the claims, reference being had to the accompanying drawings, in which:—

Figure I is a perspective view of an ordinary sound box equipped with a needle and needle holder constructed according to my invention. Fig. II is an enlarged detail view of a portion of the needle bracket, together with the needle holder and point, showing the relative position of the different parts. Fig. III is a view of the needle holder showing the manner of inserting the thorn point. Fig. IV is a top plan view of the holder. Fig. V is a transverse sectional view of the holder bracket on the line V—V, Fig. II.

Referring more in detail to the parts:

1 designates a sound box and 2 a needle bracket which may be of any ordinary and well known construction, the latter being provided with a socket 3 and a set screw 4 by means of which a needle or needle holder may be rigidly held in position.

5 designates a point holder having an offset socket member 6 and a shank 7 which latter is adapted to fit within the socket 3 of bracket 2. Extending through member 6 is a socket 8 which is preferably of a cone shape and projected at a slight inward angle as indicated in Figs. II, III, and IV.

9 designates the tapering needle point which is adapted to fit within socket 8 with its sharpened portion projecting through the small end of the socket in position for projection into the record grooves and with its blunt end preferably in the plane of the top of member 6, so that when the holder is deposited in the bracket, the upper end of the point may bear against the lower end of the bracket and be held firmly in place to obviate loosening when the machine is in operation.

While the needle may be cut to the proper length to fit the holder, as described, the best results are obtained when a thorn or needle of greater length is used, when the point of the thorn is inserted into the socket 8 and the enlarged end broken off, as indicated in Fig. III, in this way securing a close, tight fit of the point within its socket and insuring an engagement of the upper end of the point against the bracket member.

In using my device the sound box and needle bracket are arranged and operated in the manner usual with any well known type of talking machine. When it is desired to insert a needle the holder member 5 is removed from the bracket and a thorn projected into and through the socket 8 and pressed until a tight fit is secured, when the upper end of the thorn is broken off as indicated in Fig. III. The holder shank is then inserted into the bracket socket with the upper face of the socket member 6 engaging the lower end of the bracket, and the set screw 3 is tightened against the holder shank to hold the parts in position. The needle is then placed in the record groove in the usual way and the machine operated, the point being held against displacement by its engagement with the lower end of the bracket although the close fit of the point within the

holder socket is ordinarily sufficient to prevent displacement.

After the record is played and a new needle is desired, the holder is removed from the bracket after loosening the metal screw and the needle point removed from the holder by pressing the projecting point against a hard substance, a new point inserted and the holder replaced in the bracket.

10 Having thus described my invention what I claim as new therein and desire to secure by Letters Patent is:—

1. In a needle for talking machines, a point holder having a shank member, and a later-
15 ally projecting socket member having a downwardly and inwardly projecting socket, substantially as set forth.

2. In a needle holder for talking machines a holder shank provided with a laterally pro-
20 jecting socket member having a socket taper-

ing longitudinally and toward the shank body, said socket member being adapted to receive and hold a tapered needle point wholly by the fit of such point therein.

3. A needle holder for talking machines 25 comprising a needle bracket, a point holder having a shank member adapted for projection into said bracket and a laterally projecting socket member having a conoidal socket extending therethrough and inclined toward 30 the shank body, said socket member being free from binding parts but said bracket being provided with means for anchoring said shank therein, substantially as set forth.

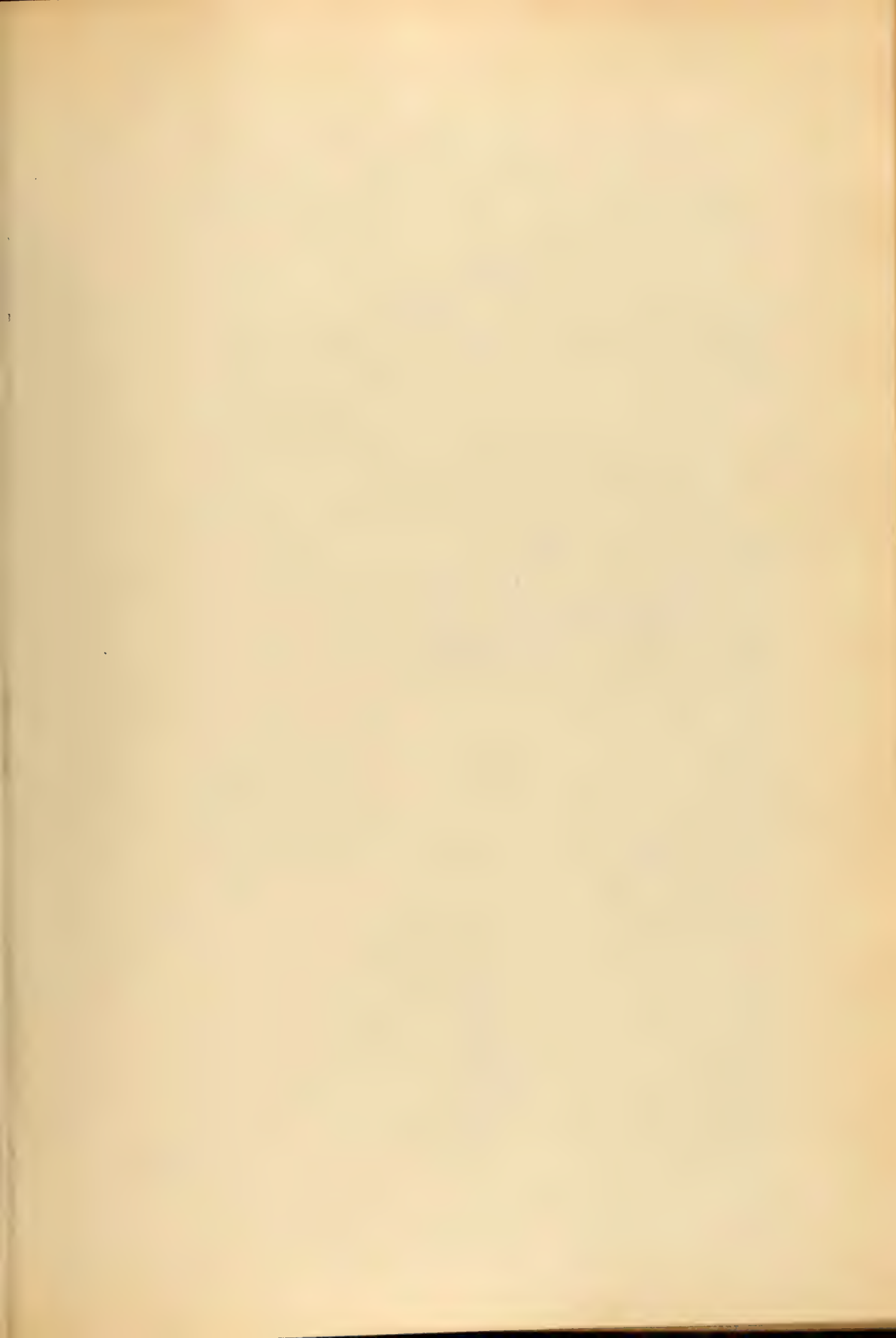
In testimony whereof I affix my signature 35 in presence of two witnesses.

WILBUR B. CLAFLIN.

Witnesses:

GEO. HORN,

HAROLD E. RICHARDS.



H. E. WOODS.
 PHONOGRAPH ATTACHMENT.
 APPLICATION FILED SEPT. 28, 1908.

918,111.

Patented Apr. 13, 1909.

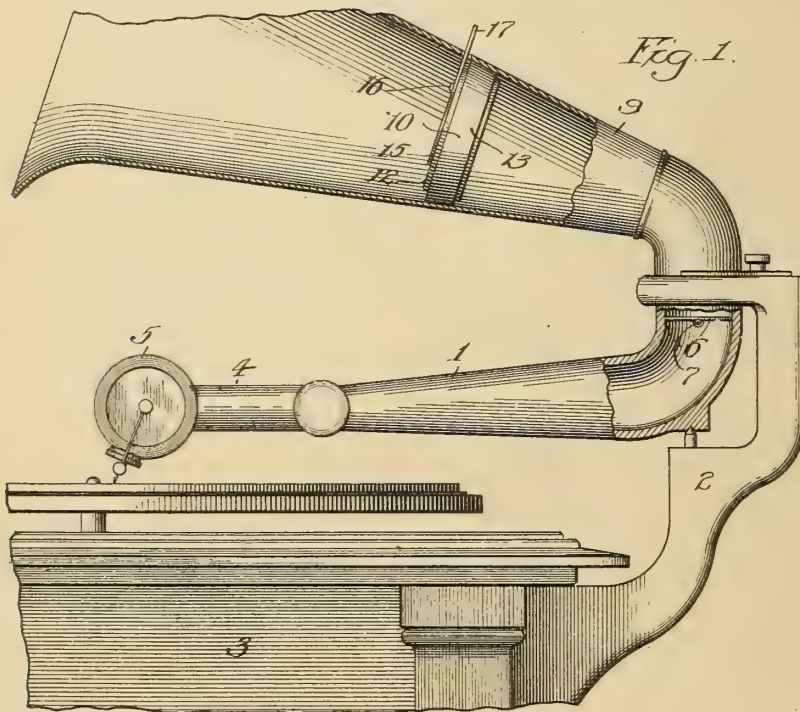


Fig. 1.

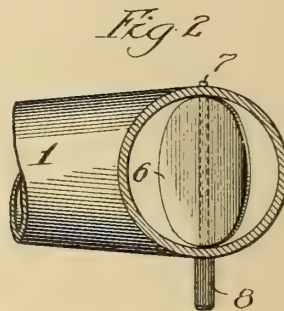


Fig. 2.

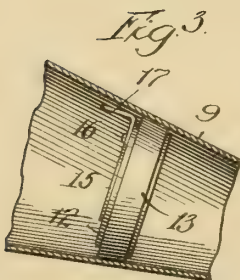


Fig. 3.

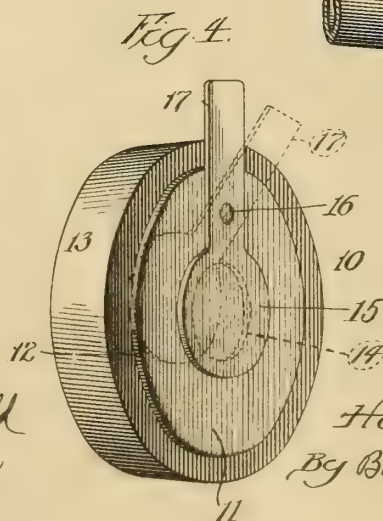


Fig. 4.

Witnesses:
 Irving Mac Donald
 McCalland Young.

Inventor:
 Harry E. Woods.
 By Barton, Panner & Folsch,
 Attys

UNITED STATES PATENT OFFICE.

HARRY E. WOODS, OF CHICAGO, ILLINOIS, ASSIGNOR OF ONE-HALF TO HALLIE S. WOODS

PHONOGRAPH ATTACHMENT.

No. 918,111.

Specification of Letters Patent.

Patented April 13, 1909.

Application filed September 28, 1908. Serial No. 455,074.

To all whom it may concern:

Be it known that I, HARRY E. WOODS, citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Phonograph Attachments, of which the following is a full, clear, concise, and exact description.

My invention relates to attachments for phonographs, and more particularly to means for regulating the volume and quality of the sound produced. Its object is to provide a simple and inexpensive device which may either be permanently secured to the machine at the time of its manufacture or which may be readily attached to a completed machine, and which will enable the operator to control the sound to suit the conditions under which the machine is used, or to produce the best results with a particular record.

The several features of my invention may be readily understood by reference to the accompanying drawings, in which—

Figure 1 is a fragmentary view in side elevation of a phonograph provided with the attachment of my invention, parts of the machine being broken away for the sake of clearness of illustration; Fig. 2 is a plan sectional view of the end of the tapering arm, illustrating, in a partially open position, the form of regulator which I prefer to employ in said arm in addition to the sound regulator of my invention; Fig. 3 is a fragmentary sectional view of the horn, showing a modified form of attachment fitting therein; and Fig. 4 is a perspective view of the attachment which fits within the horn.

Like parts are designated by similar reference characters throughout the several views.

I have shown in the drawings a well-known type of phonograph, in which a tapering arm 1 is pivotally mounted at its enlarged end upon a bracket 2 extending from the box 3 of the machine. The swinging arm 4, which carries the sound reproducing mechanism 5, is mounted in the end of the arm 1. This mechanism being of well-known construction, further description thereof is unnecessary.

Fitting within the passage of the tapering arm 1 is a damper designed to cooperate with the sound regulator of my invention. This damper is preferably of the form shown in detail in Fig. 2, which consists of a disk 6, adapted to be rotated upon a pin 7 as an axis. The pin 7 is suitably secured to the disk and

extends diametrically across the face thereof. The ends of the pin 7 are journaled in the arm 1, and a projecting thumb piece 8 provides means for rotating the disk, and the opening or closing the passage in the arm 1 through which the sound waves reach the horn 9.

Located upon the interior of the horn 9 and cooperating with the damper 6 is the sound-regulator 10 of my invention. For most purposes this latter regulator alone suffices, but I have found that in some cases the supplemental regulator 6 is desirable as providing additional accuracy of regulation.

The sound-regulator 10 consists of a disk 11, having a peripheral flange 12, about the exterior of which is placed an annular washer 13 of soft rubber or other suitable material. The perimeter of the disk 11 has a contour similar to the interior cross-sectional contour of the horn, which is shown in the drawings as circular. The attachment 10 is inserted in the enlarged end of the funnel-shaped horn and is shoved down to a position in which a tight fit of the attachment within the horn is secured. The pliable washer 13 assists in securing such fit, and further acts as a muffler which prevents any clattering of the disk 11.

The disk 11 is provided with a passage therethrough for sound. This passage may be in the form of a single opening 14 (though other forms of passage may be provided), controlled by a shutter 15, which is pivoted at 16 on the disk 11. In Fig. 4 I have illustrated the opening 14 completely closed by the shutter, while in dotted lines the shutter is shown swung away from the opening.

The handle 17 for operating the shutter may extend in a plane parallel with the disk 11, as shown in Figs. 4 and 4', in which case, of course, the horn 9 is provided with a slot through which the handle projects. The handle is thus readily accessible from the exterior of the horn. In some cases however it is preferable to bend the handle angularly outward, the end of the handle in this case extending longitudinally within the horn, as shown in Fig. 3. When the attachment is provided with this modified form of shutter operating handle, it is especially adapted for attachment to a phonograph by mere insertion within the horn thereof.

The disk 11 is preferably a thin metallic disk, as, of various materials tested, I have

found that the most satisfactory results are produced when such disk is employed.

I have found that by employing the sound regulator of my invention the harsh, metallic sounds commonly produced by phonographs are prevented, the natural tones which were used for producing a record being reproduced. Furthermore, without changing the horn of the instrument, the loudness of the tones can readily be regulated to suit the fancy of the operator or to most satisfactorily reproduce each particular record.

I claim:—

1. The combination with a phonograph horn, of a sound regulator adapted to fit frictionally within said horn, said regulator consisting of a disk and a lateral flange thereon formed of a single integral piece, said disk being provided with an opening therethrough, a shutter pivoted on said disk at one side of said opening and arranged to swing in parallel relation to said disk to regulate the closure of said opening, and a washer of resilient material fitting over said flange.

2. A sound-regulator for phonographs comprising a disk having an opening therein, a peripheral flange integral with said disk, a washer about said flange, a shutter for said opening, said shutter being pivoted upon

said disk and arranged to swing over the face thereof to regulate the closure of said opening, and an operating handle for said shutter, said handle extending at an angle to the plane of said shutter, said regulator being thus adapted for removable insertion in the horn of a phonograph.

3. In a phonograph, the combination with a tapering horn, of a sound regulator arranged to fit within said horn in frictional engagement with the interior walls thereof, said regulator comprising a disk having an opening therein, a peripheral flange integral with said disk, a washer about said flange, a shutter for said opening, said shutter being pivoted upon said disk and arranged to swing over the face thereof to regulate the closure of said opening, and an operating handle for said shutter, said handle being bent away from said disk at an angle to the plane of said shutter and thereby adapted to lie wholly within the interior of said horn.

In witness whereof, I hereunto subscribe my name this 25th day of September, A. D., 1908.

HARRY E. WOODS.

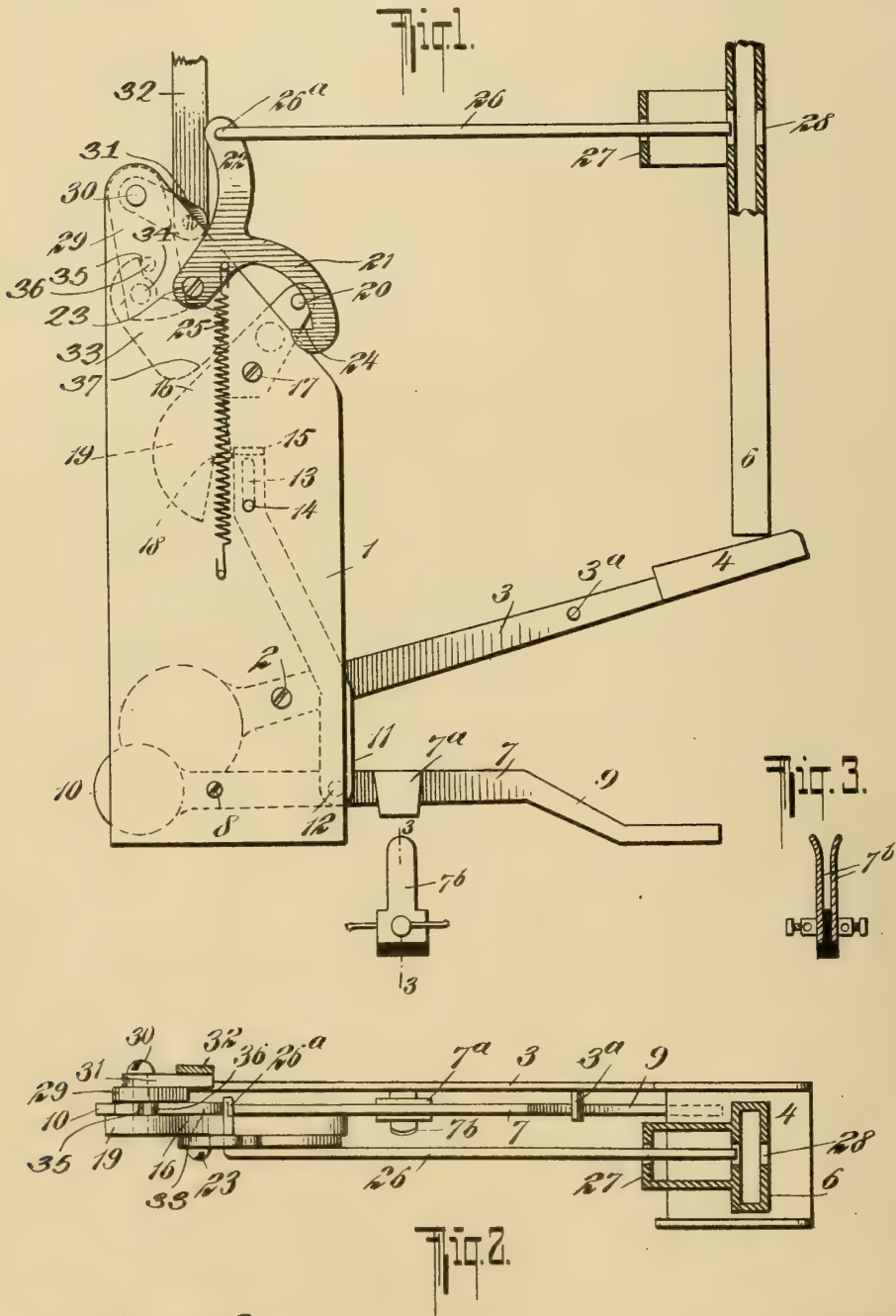
Witnesses:

GEORGE E. FOLK,
ALFRED H. MOORE.

H. KOCH.
 COIN CONTROLLED MECHANISM.
 APPLICATION FILED SEPT. 10, 1908.

918,165.

Patented Apr. 13, 1909.



WITNESSES
Julius H. Koch
John A. Tildenbeck

INVENTOR
Henry Koch
 BY
Briesen & Knauth
 ATTORNEYS

UNITED STATES PATENT OFFICE.

HENRY KOCH, OF RAHWAY, NEW JERSEY, ASSIGNOR TO THE REGINA COMPANY OF RAHWAY, NEW JERSEY, A CORPORATION OF NEW JERSEY.

COIN-CONTROLLED MECHANISM.

No. 918,165.

Specification of Letters Patent.

Patented April 13, 1909.

Application filed September 10, 1906. Serial No. 333,910.

To all whom it may concern:

Be it known that I, HENRY KOCH, a citizen of the United States, and a resident of Rahway, county of Union, and State of New Jersey, have invented certain new and useful Improvements in Coin-Controlled Mechanism, of which the following is a specification.

My invention relates to mechanism which is controlled by a coin, as for instance starting mechanism for music boxes, phonographs and the like and has for its object to improve the construction of mechanism of this kind.

My invention will be fully described hereinafter and the features of novelty will be pointed out in the appended claims.

Reference is to be had to the accompanying drawings illustrating a specific embodiment of my invention in which—

Figure 1 is an elevation of my improved mechanism. Fig. 2 is a plan view thereof; and Fig. 3 is a sectional view on the line 3—3 of Fig. 1.

1 is a stationary portion of the machine to which is pivoted at 2 a lever 3, having at its one end a coin receiving pan 4. At its other end the lever 3 is provided with a weight 5. The coin pan 4 extends beneath the coin chute 6, which may be of any customary construction and is secured in position on the machine in any suitable manner.

7 is a starting lever pivoted at 8 to the stationary portion 1 and having an inclined portion 9 near its one free end and a weight 10 at its other end. The lever 7 is further provided with a conducting member 7^a adapted under certain conditions to enter the space between the two members of the switch 7^b and thus close the electrical circuit for starting the instrument. An arm 11 is pivotally connected at 12 with the lever 7 and is guided on the portion 1 by means of a slot 13 and pin 14, its upper end being bent at substantially right angles as shown at 15.

16 is a member pivoted at 17 to the portion 1 and provided with a notch 18 into which the portion 15 of the arm 11 is adapted to enter as will be described more clearly hereinafter. The said member is weighted at 19 so that its lower end will have a tendency to swing toward the arm 11. At its other end said member is provided with a pin 20 adapted for engagement with the projection 21 of the arm 22, which is pivoted at 23 to the portion 1 of the machine. The pro-

jection 21 is provided with a hook 24 to prevent the disengagement of the member 16 and said projection 21. A spring 25 tends to draw the arm 22 and projection 21 downwardly. A rod 26 is connected with the arm 22 and extends through a bearing 27 attached to the coin chute 6, so that its free end is in close proximity to openings 28 in said chute 6.

29 is a member secured to a shaft 30 which also carries the arm 31, to which is attached the rod 32. The other end of this rod 32 is connected with suitable mechanism adapted to engage the music sheet, in the present instance, for the purpose of stepping the mechanism when the end of a selection has been reached. A dog 33 is pivoted at 34 to the member 29 and is provided with a shoulder 35 adapted for engagement with a pin 36 on the member 29. The dog 33 is thus free to swing in one direction only being held against movement in the other direction by the engagement of the shoulder 35 with said pin 36. The outer edge of said dog is curved as at 37 for the purpose to be described presently.

In operation a coin of the proper denomination is inserted in the coin chute 6 and drops into the pan 4. The weight of the coin swings the lever 3 on its pivot 2, it being understood that the weight of said coin is sufficient to overcome the resistance of the weight 5. As the lever swings downward, the pin 3^a thereof will engage the inclined portion 9, of the lever 7 and swing it on its pivot 12, the resistance of the weight 10 being overcome, and will force the portion 7^a between the two members of the switch 7^b and thus complete the circuit and start the machine. It is to be understood that the switch 7^b is connected with a suitable source of electrical energy. After the circuit has been closed as just described the lever 3 will be in a position with the pan 4 inclined downwardly so that the coin will slide from said pan into a suitable receptacle. As the lever 7 is swung on its pivot in the manner just described it will draw the arm 11 down until the portion 15 thereof is below the level of the notch 18, whereupon the member 16 will, through the medium of its weighted end 19, be caused to swing on its pivot 17 so that the notch 18 will take over the portion 15 and securely lock the lever 7 in the position where the electrical circuit is closed. As

soon as the coin drops off the right-hand end of the pan 4, the lever 3 swings back to the normal position shown in Fig. 1, without, however, affecting the position of the switch-lever 7 which remains in the depressed circuit-closing position. As the member 16 swings on its pivot the pin 20 moves toward the left, and the spring 25 swings the arm 22 and projection 21 on the pivot 23 and moves the rod 26 to the right in Fig. 1. In this position the rod 26 obstructs the coin chute 6 so that if a second coin were inserted in said chute before the selection being played, had been finished, the said coin would be held by the rod 26 and thus prevented from dropping out of the chute without being effective to start the mechanism.

In the case of an instrument using a music roll, as in the present instance, the said roll is provided at suitable intervals with openings which control the mechanism for stopping the machine at the end of a selection.

A member suitably connected with the rod 32 is controlled by an opening provided in the music roll, this being a customary part of many automatic instruments of this character. As the said member, at the end of a piece, comes into registry with one of the openings in the music roll, it will move in such a manner as to cause the rod 32 to travel upward. This will cause the shaft 30 to rotate contra-clockwise, carrying with it the member 29 and the dog 33. The outer edge 37 of the dog will engage the pin 20 and move it by a cam-action toward the right, thus bringing the locking member 16 and the arm 21, 22 back to the position shown in Fig. 1. This return movement of the locking member 16 releases the arm 11 and allows the weight 10 to restore the switch-arm 7 to its original position in which the circuit is broken. The parts, however, are so timed that the music sheet continues to move a short while after the member connected with the rod 32 has moved into the opening of the roll, thus immediately before the stopping of the mechanism the said member again comes in contact with the solid surface of the roll, so that the rod 32 is moved downward back to its original position. During this downward movement the lower edge of the dog 33 engages the pin 20 (which, as explained has returned to the position shown in Fig. 1) and the dog swings on its pivot 34 so that it may pass the pin without operating it. As soon as the dog 33 clears the pin 20, gravity causes it to drop back into engagement with the pin 36, as shown in Fig. 1. As the arm 21, 22 is swung contra-clockwise on its pivot 23 by the return movement of the pin 20, the rod 26 is withdrawn toward the left so as to clear the coin chute 6 for passage of another coin. The parts thus resume the position shown in Fig. 1.

Various modifications may be made with-

out departing from the nature of my invention as defined in the claims.

I claim as my invention:—

1. In coin-controlled mechanism, the combination, with the coin-lever, of an independent separate starting lever adapted to be engaged by said coin-lever.

2. In coin-controlled mechanism, the combination, with the coin-lever, of the starting lever adapted to be moved in one direction by said coin-lever, a device for locking the starting lever after it has been moved by the coin-lever, and means for releasing the locking device.

3. In coin-controlled mechanism, the combination of a depressible starting lever, means for locking the starting lever in its depressed position, a device for releasing said locking means, and a coin-lever movable independently of the starting lever and arranged to depress the same.

4. In coin-controlled mechanism, the combination of the starting lever, means for locking the same in the starting position, a device for releasing said locking means, and a coin-operated member arranged to move the starting lever to its operative position, but capable of an independent return movement.

5. In coin-controlled mechanism, the combination of a starting member having means for returning it to its inactive position, means for locking the said member in its active position, a device for releasing said locking means, and a coin-operated member arranged to move said starting member to its operative position, but capable of an independent return movement.

6. In coin-controlled mechanism, the combination of a starting lever, an arm connected therewith, a locking lever for holding said arm when the starting lever is in its active position, a device for holding and releasing said locking lever, and a coin-lever arranged to move the starting lever to its operative position.

7. In coin-controlled mechanism, the combination of the starting lever weighted so as to return it to its inactive position, means for locking said lever in its active position, a device for holding and releasing said locking means, and a coin-operated member arranged to move said starting lever to its operative position.

8. In coin-controlled mechanism, the combination of a starting lever, an arm connected therewith, a locking lever normally held in its inactive position by said arm but adapted to move into a locking position when the starting lever reaches its active position, a holding and releasing device engaging said locking lever, and a coin-operated lever arranged to move the starting lever to its operative position.

9. In coin-controlled mechanism, the combination of the starting lever weighted so as

to return it to its inactive position, the arm connected with said lever, the locking lever normally held in its inactive position by said arm but adapted to move into a locking position when the starting lever reaches its active position, a holding and releasing lever engaging said locking lever, a coin-chute, an obstructing member connected with said holding and releasing lever and adapted to project into the coin-chute, a rocking member, a dog having limited pivotal movement on said rocking member and adapted to move the holding and releasing lever in the releasing direction but to leave it stationary when the dog moves in the opposite direction, and a coin-lever in receiving relation to the coin-chute and adapted to operate the starting lever.

10. In coin-controlled mechanism, the combination of a starting member, coin-operated means for moving said member to its active position, locking means for holding said member in its active position, a releasing device controlling the position of the locking means, and an obstructing device, connected with the releasing device and adapted to temporarily prevent the access of a coin to said coin-operated means.

11. In coin-controlled mechanism, the

combination with the coin-lever of a pivoted starting lever adapted to be moved into operative position by said coin-lever.

12. In coin-controlled mechanism, the combination with the pivoted coin-lever having means for returning it to its normal position, of a pivoted starting lever adapted to be moved into operative position by said coin lever.

13. In coin-controlled mechanism, a coin-chute, a coin-lever having its one end adjacent to the mouth of said chute and a starting lever arranged to be moved into operative position by said coin-lever.

14. In coin-controlled mechanism, a coin-chute, a coin-lever having its one end adjacent to the mouth of said chute, a starting lever arranged to be operated by said coin lever and means arranged to be moved into the path of the coin in the coin-chute to obstruct said coin chute at the same time that the starting lever is moved by the coin-lever.

In testimony whereof, I have hereunto set my hand in the presence of two subscribing witnesses.

HENRY KOCH.

Witnesses:

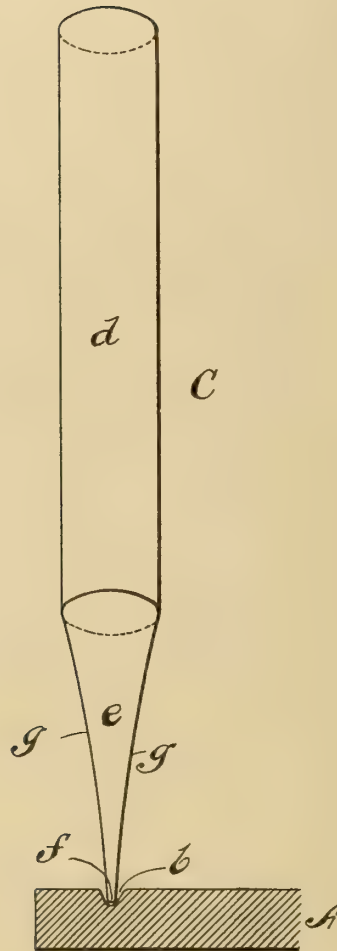
WM. J. FROST.

J. B. FURBER.

J. E. & W. B. SULLIVAN.
TALKING MACHINE NEEDLE.
APPLICATION FILED SEPT. 11, 1907.

918,389.

Patented Apr. 13, 1909.



*John E. Sullivan and
William B. Sullivan*
Inventors

Witnesses

D. M. Stewart
H. H. Hernan

by

[Signature]

Attorney

UNITED STATES PATENT OFFICE.

JOHN E. SULLIVAN, OF READING, AND WILLIAM B. SULLIVAN, OF PHILADELPHIA.
PENNSYLVANIA.

TALKING-MACHINE NEEDLE.

No. 918,389.

Specification of Letters Patent.

Patented April 13, 1909.

Application filed September 11, 1907. Serial No. 392,269.

To all whom it may concern:

Be it known that we, JOHN E. SULLIVAN and WILLIAM B. SULLIVAN, both citizens of the United States, and residents, respectively, of the city of Reading, in the county of Berks, and the city and county of Philadelphia, both in the State of Pennsylvania, have invented certain new and useful Improvements in Talking-Machine Needles, of which the following is a specification.

Our invention relates generally to phonographs or talking machines, and more particularly to an improved form of stylus or needle for engaging the wave-line groove of the record; the main object being to insure a uniformly accurate reproduction of the sounds by which said record was originally produced, while at the same time preventing deterioration of the record by the action of the needle upon the finely lined groove thereof, such as ordinarily rapidly occurs.

The invention is fully described in connection with the accompanying drawing and the novel features are specifically pointed out in the claim.

The drawing is a fragmentary cross-sectional view of a talking machine record showing the groove thereof greatly enlarged and with my improved stylus or needle engaged therein, the latter being correspondingly enlarged.

Owing to the extreme nicety with which the delicately defined groove of the record must be followed by the needle of the reproducing mechanism in order that the finest recorded vibrations may be accurately reproduced, great difficulty has been heretofore experienced. This is due to the minute but practically serious wear of the needle and groove which results from their frictional contact throughout the long and devious course of the record-groove, and to the modification of the original sounds which ordinarily result from a scratchy action of the needle in following the sinuous path to which it is confined.

The object of our invention is to eliminate these defects, and this object we have found to be practically attained by forming the needle as indicated in magnified dimensions in the drawing.

A indicates a record disk, having a spiral groove *b* as usual, corresponding in its sinuities with the vibrations imparted to the recording diaphragm by the recorded sounds;

and C indicates our improved needle with its point engaged in said groove; a showing of these parts only of a sound recording and reproducing machine being required to illustrate our invention, and such parts being enlarged, as previously stated, so as to make clear the distinguishing features of form and proportions.

To enable the invention to be utilized with ease and certainty, as applicable to the well-known records indicated, the construction of our improved needle C will be specifically described by indicating exact measurements as actually employed by us in practically attaining the desired results. The material preferably employed is high grade steel wire of sixty-five one-thousandths (.065) of an inch in diameter; and the full length of the needle being twenty-one thirty-seconds of an inch, the round body portion *d* thereof is made fourteen thirty-seconds of an inch, and the tapered end portion or tip *e* seven thirty-seconds of an inch in length. The point *f* of the tip *e*, which is made slightly blunt as indicated, has a diameter of two one-thousandths (.002) of an inch, and the incline *g* of the tapered tip, instead of being straight, is inwardly curved or "concaved" longitudinally as shown, to a radius of about three inches, so that the diameter at the blunted point is very gradually increased at first and thereafter more rapidly as it extends into the round body *d*. The improved effect of this novel shape of record-needle tip is very marked, both in the securing of more accurate reproductions of the exact original sounds free from the unpleasing tones commonly introduced in the reproduction; and in the avoidance of wearing action upon the record whereby its usefulness is ordinarily soon destroyed or impaired. The point *f* rests in the bottom of the groove *b* as to greatly reduce friction and "scratch" while at the same time accurately following the delicate deflections of the groove; and the relative diameters and lengths of the so-called "concaved" tip and round body, as indicated by the dimensions of our actual construction stated above, give sufficient rigidity to the needle to prevent alteration of the tones because of undue yielding in the needle structure. Notwithstanding the hardness of the needle material there has been heretofore not only the objectionable "scratch" referred to, but such wear of the

sharp needle point during its contact with the very lengthy groove of many records, as to frequently cause quite imperfect reproduction of the latter portion; which effect is
5 avoided in my improved needle by the fact that the point *f* is not only slightly blunted originally but that it is so slightly changed in diameter by wear, owing to the "concaved" conical form of the tip, as to have
10 no appreciable effect upon the proper reproduction of the whole record.

What we claim is:—

The talking machine needle described comprising a body and a concavely tapered point. 15

In testimony whereof, we affix our signatures, in the presence of two witnesses.

JOHN E. SULLIVAN.

WILLIAM B. SULLIVAN.

Witnesses:

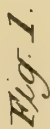
D. M. STEWART,

W. G. STEWART.



918,915.

4 SHEETS—SHEET 1.

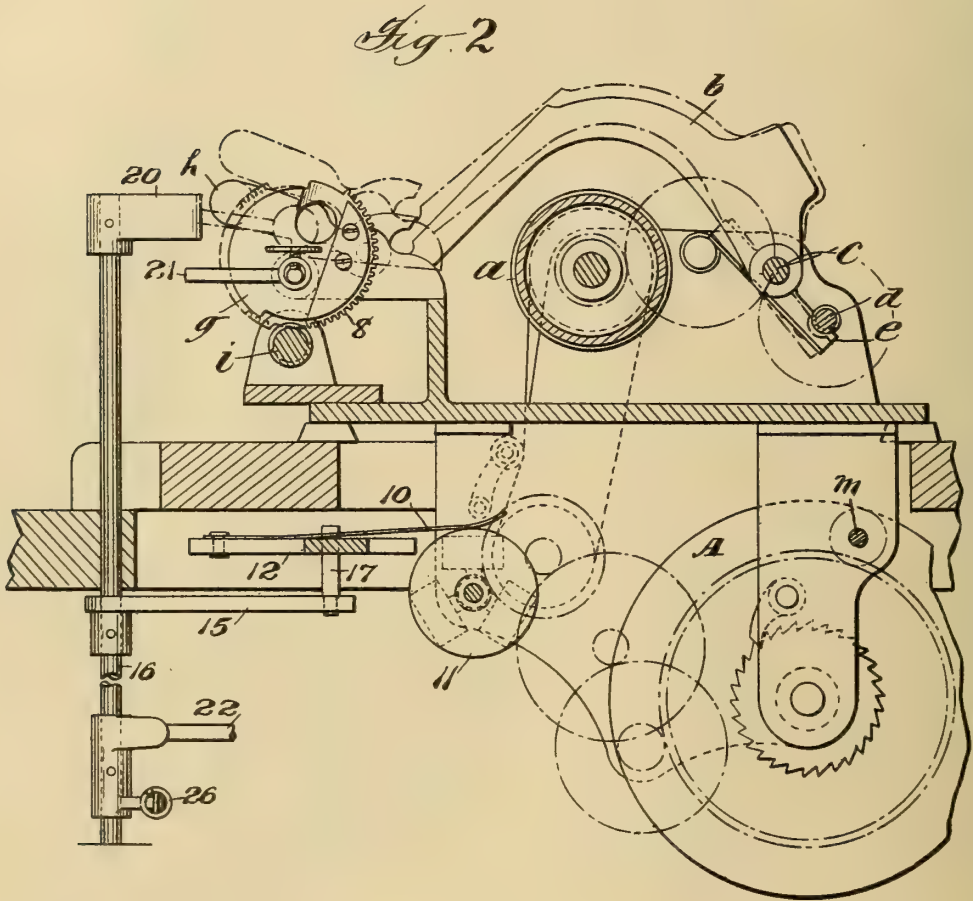


Inventor:
William W. Rensfield
by his Attys:
Phillips Sawyer & Rice & Kennedy

W. W. ROSENFELD.
 STARTING AND STOPPING DEVICE FOR PHONOGRAPHS.
 APPLICATION FILED FEB. 1, 1905.

918,915.

Patented Apr. 20, 1909.
 4 SHEETS—SHEET 2.



Witnesses
D. K. Haeber
G. Galiani

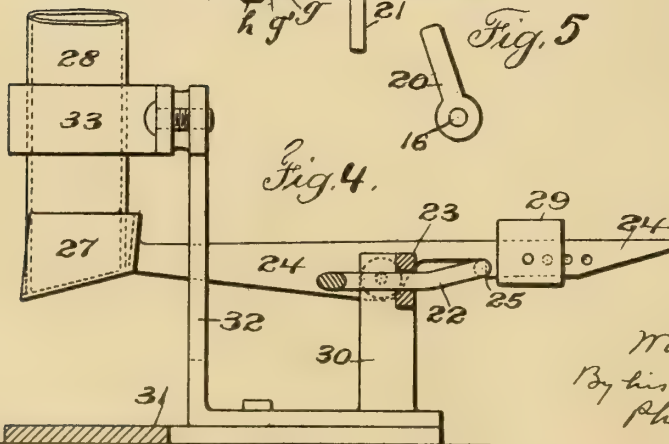
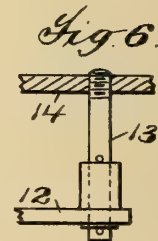
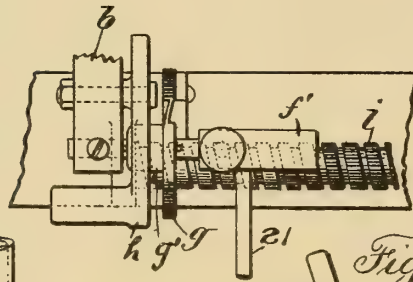
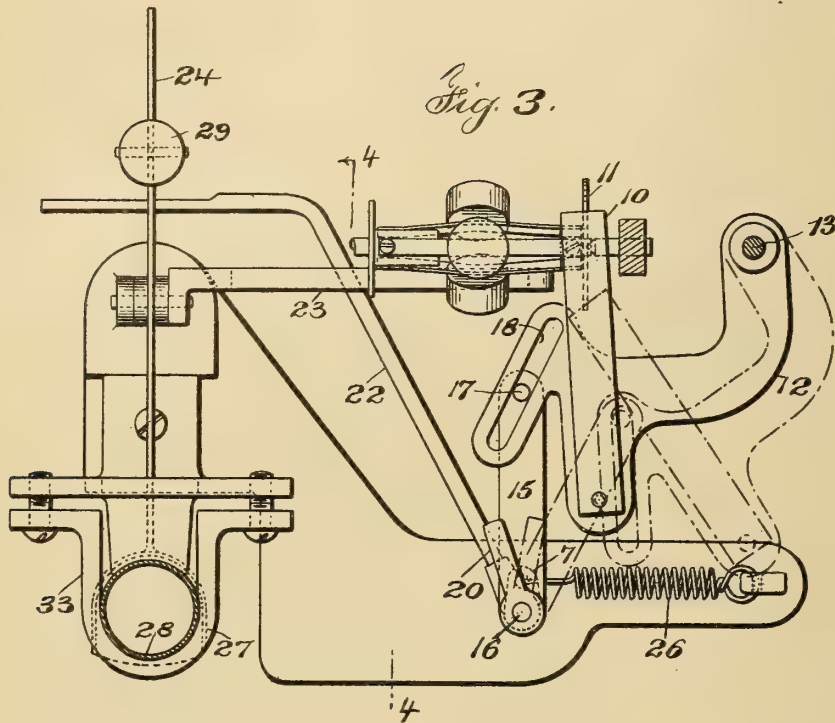
Inventor
William W. Rosenfield
 By his Attorneys
Philip Sanger Rice Kenney

W. W. ROSENFELD.
 STARTING AND STOPPING DEVICE FOR PHONOGRAPHS.
 APPLICATION FILED FEB. 1, 1906.

918,915.

Patented Apr. 20, 1909.

4 SHEETS—SHEET 3.



Witnesses
 O. H. H. H.
 H. H. H.

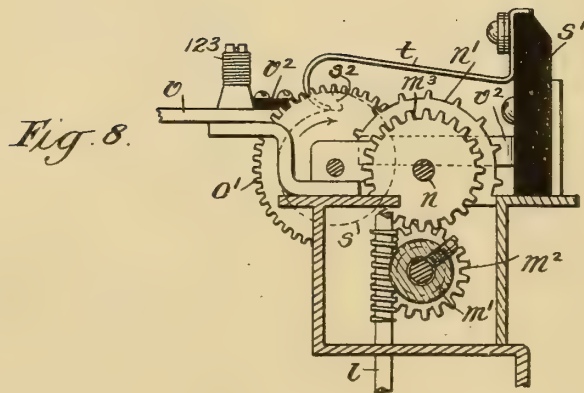
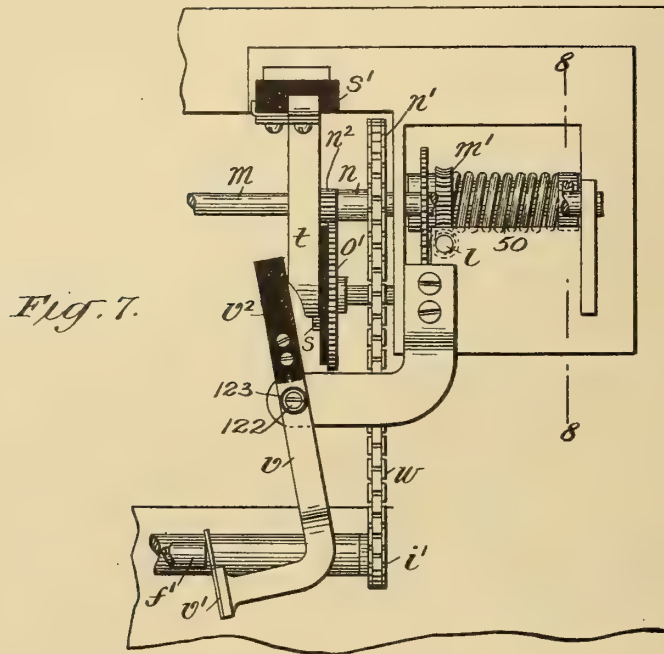
Inventor
 William W. Rosenfeld
 By his Attorney
 Philipp Sanger Ruef & Kennedy

W. W. ROSENFELD.
 STARTING AND STOPPING DEVICE FOR PHONOGRAPHS.
 APPLICATION FILED FEB. 1, 1905.

918,915.

Patented Apr. 20, 1909.

4 SHEETS—SHEET 4.



Witnesses:
 m. c. massie.
 M. Taylor.

Inventor:
 William W. Rosenfeld
 by his Attys:
 Phillips, Lawrence, Rice & Kennedy

UNITED STATES PATENT OFFICE.

WILLIAM W. ROSENFELD, OF NEW YORK, N. Y.

STARTING AND STOPPING DEVICE FOR PHONOGRAPHS.

No. 918,915.

Specification of Letters Patent.

Patented April 20, 1909.

Application filed February 1, 1905. Serial No. 243,612.

To all whom it may concern:

Be it known that I, WILLIAM W. ROSENFELD, a citizen of the United States, residing at New York city, county of New York and State of New York, have invented certain new and useful Improvements in Starting and Stopping Devices for Phonographs, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

This invention relates to starting and stopping devices intended especially for phonographs, though capable of general application to operating mechanisms and more especially to light machinery; and the invention aims principally to provide means for insuring the starting of the phonograph or other machine when it is desired that it shall start. Especially with spring motors, such as are commonly used for operating phonographs, it has been found that when the starting device is moved to release the operating mechanism and start the motor, it will sometimes happen that the mechanism will not start of itself, but will need to be jarred or otherwise started. It is especially important in check controlled or other automatically operating phonographs that the operating mechanism shall always start when the starting or releasing mechanism is moved.

The certain starting of the operating mechanism of a phonograph or other machine upon the movement of the starting or releasing device is secured in accordance with the invention by providing means for imparting a starting impulse to a part of the operating mechanism. For this purpose the operation of the phonograph or other machine is preferably controlled by a brake acting on a rotating part of the operating mechanism, and which when moved to release said part imparts a starting impulse thereto.

The invention includes other features relating to automatic stopping and starting devices for phonographs, all of which will be hereinafter fully described and specifically pointed out in the claims.

A full understanding of the invention can best be given by a detailed description of a preferred construction embodying the various features thereof, and such a description will now be given in connection with the accompanying drawings showing the invention as applied to an automatically operated

phonograph such as shown and described in an application filed by me August 5, 1904, Serial No. 219,599, and in connection with check actuated mechanism such as shown and described in an application filed by me October 15, 1903, Serial No. 177,112.

In said drawings: Figure 1 is a front elevation of a phonograph provided with automatic rewinding, return and starting and stopping mechanisms in accordance with the present invention. Fig. 2 is a section on line 2 of Fig. 1. Fig. 3 is a plan view of the starting and stopping mechanism and check actuated mechanism for controlling the driving movement. Fig. 4 is a section taken on line 4 of Fig. 3. Fig. 5 is a partial plan view of parts shown in Fig. 2. Fig. 6 is a detail view which will be hereinafter referred to. Fig. 7 is a plan view of the mechanism shown at the right in Fig. 1. Fig. 8 is a section on line 8 of Fig. 7.

Referring to the drawings, *a* represents the mandrel or record carrier, *b* the reproducer arm mounted to slide on the rod *c* of the feed screw, and *d* the feed nut of a phonograph of common construction. The mandrel *a* and feed screw *d* are driven by a spring motor *A* as usual in machines of the type shown, the motor thus forming part of the operating mechanism of the phonograph. The reproducer arm *b* carries upon a laterally extending portion thereof an eccentrically pivoted disk *g* which co-acts with a return feed screw *i* for raising the reproducer arm and returning the same to starting position, the disk being rotated by the engagement of teeth *s* on the disk with teeth on the return feed screw for raising the reproducer arm when the return feed screw is rotated, and a return movement being then imparted to the disk and reproducer arm by means of the engagement of a part of the disk with the thread of the return screw.

The eccentric disk *g* is provided with a hub *g'* having a notch with which a latch *h* is adapted to engage, whereby after the disk has been turned into position to engage with the thread of the return screw it will be held against further rotation during the return movement of the reproducer arm. As the reproducer reaches the end of its return movement this latch *h* is tripped by engagement with an adjustable cam *ru* on arm 113, thereby releasing the cam disk and per-

mitting it to be turned by the continued rotation of the return feed screw to bring its low portion opposite the screw and thereby lower the reproducer arm to bring the reproducer again into position to engage the record. The teeth on the return feed screw do not extend over the full length of the screw, the portion of the screw with which the disk engages when the reproducer has been returned to its starting position being circumferentially smooth. When the disk has been turned, therefore, to lower the reproducer arm, it will, during any further rotation of the return feed screw, as well as during the next reproducing movement of the reproducer, rest with its lower portion opposite the return feed screw and with the shoulder formed by the first of its teeth bearing against the return feed screw ready to be engaged by the teeth on the return feed screw when the latter is rotated for the next return movement, the disk being balanced or weighted so as to rest in this position. This automatic return mechanism is more fully shown and described in my application No. 219,599, before referred to, and for a fuller description thereof reference is made to such application.

The spring of the motor A is automatically rewound after each reproducing operation of the phonograph, and the return shaft i driven, by means of an electric motor E which is shown as connected with the winding spindle of the spring motor and with the return shaft i and controlled by a circuit opening and closing means as in my application No. 219,599 above referred to. The upwardly extending shaft l of the electric motor is provided with a worm meshing with a worm wheel m' loosely mounted on a shaft m and connected therewith through a suitable friction or slip coupling 50. The shaft m is connected with the winding shaft of the spring motor so as to effect the winding of the spring of the spring motor when the shaft m is rotated, and the interposition of the friction coupling 50 between the worm wheel and the shaft m permits of the electric motor operating for such length of time at each operation as to always insure a full rewinding of the spring motor, since the friction coupling permits the worm gear to be driven after the spring motor has been fully rewound, the resistance to the rotation of the shaft m then being sufficient to cause the parts of the coupling to slip. A gear m^2 fast to the worm gear m' meshes with a gear m^3 on a short shaft n , which shaft will thus be driven so long as the motor operates. The return feed screw i is driven from this shaft n by a sprocket chain w running on a sprocket wheel n' on the shaft n and a sprocket wheel v' on the feed screw shaft. The shaft n also carries a pinion n^2 meshing

with a gear o' mounted to rotate with which is an insulated cam disk s of conducting material having an undercut shoulder s^2 between the high and low portions of its cam periphery. A spring contact arm r^2 bears constantly against the face of the cam disk s , and a second spring contact arm t is adapted to bear against the periphery of the cam disk, being, however, normally held out of engagement therewith by means of a rocking arm or lever v when the cam disk is in the position of rest shown in Fig. 8, the rocking lever v preferably carrying a block of insulating material v^2 for engagement with the end of the contact spring t . The contact springs r^2 and t are suitably insulated, as by being mounted on a block s' of insulating material, and are connected in the motor circuit so that when the contact spring t is in engagement with the cam disk s the motor circuit will be closed, and when the contact spring t is held out of engagement with the cam disk s the motor circuit will be open.

The rocking lever v is pivoted at 122 and is under tension of a spring 123 which tends to swing the lever on its pivot to move the block v^2 toward and beneath the contact arm t . The other end of the rocking arm is provided with a foot piece v' which lies in the path of movement of a sleeve f' carried by the reproducer arm of the phonograph, the foot piece v' when the rocking arm is in position with its insulating block beneath the end of the contact spring t lying in position to be engaged by the sleeve f' as the reproducer arm approaches the end of its reproducing movement. During the reproducing operation of the phonograph the rocking arm v is in its normal position with its insulating block v^2 beneath the end of the contact spring t . As the reproducer arm approaches the end of its reproducing movement, the sleeve f' comes into engagement with the foot piece v' and forces the lever against the tension of its spring so as to move the insulating block v^2 from beneath the end of the contact spring t , as shown in Fig. 1, permitting the latter to engage the periphery of the cam disk s as shown in Fig. 8. The circuit to the electric motor being thereby closed, the motor will start to operate and will continue to operate until the gear o' and cam disk s have made one rotation, at the end of which time the contact spring t will drop from the end of the high part of the cam disk and again rest on the insulating block v^2 , the lever v having in the meantime been returned by its spring to its normal position.

The connections between the cam disk s and the worm wheel m' and between the return screw shaft and the worm wheel are such that the cam disk is not given a complete rotation until the worm wheel has been rotated more than sufficient to insure the re-

winding of the spring motor and the return feed screw has been given a rotation more than sufficient to effect the raising of the reproducer arm and its complete return movement and to lower it again to its normal position.

The operation of the phonograph by the motor A is controlled by means of a stopping and starting device consisting preferably of a brake formed by a spring plate 10 acting on the periphery of a disk 11 on the governor shaft of the motor. The brake spring 10 is moved into and out of operative position in a direction tangential to the periphery of the disk 11, and for this purpose it is preferably and as shown carried by a reciprocating plate 12 shown as pivotally mounted on a stud 13 extending downward from the base plate 14 of the phonograph (see Fig. 6). When the plate 12 is swung in one direction, the brake spring will be carried into engagement with the periphery of the disk 11, as shown in Fig. 1 and in full lines in Fig. 2, thereby stopping the operation of the motor and of the phonograph. When the plate 12 is swung in the other direction, to retract the brake spring and release the disk, the brake spring will first move while in contact with the disk and thereby impart a starting movement thereto. Any chance of the motor and the mechanism driven thereby failing to start when released will thus be avoided.

The plate or support 12 might be actuated by any suitable means for hand or automatic operation. As shown, it is oscillated by means of a spring 26 acting through a vertical shaft 16 and an arm 15 carried by said shaft, said arm having a pin 17 extending into a cam slot 18 in the plate 12. The shaft 16 is turned against the tension of the spring 26 for causing the brake spring 10 to move into operative position by the return movement of the reproducer arm, and the turning of the shaft in the opposite direction for retracting the brake spring is controlled by the check actuated mechanism. For this purpose, in the construction shown, the shaft 16 carries at its upper end a short arm 20 projecting into the return movement path of a finger 21 carried by the reproducer arm. On the forward movement of the reproducer arm the finger 21 travels beneath the arm 20, but on the return movement of the reproducer arm when it is in its elevated position, as shown in dotted lines in Fig. 2, the finger 21 is raised so that the arm 20 extends into the path of its returning movement. The shaft 16 also carries a long latch arm 22 which extends through a slot in a guide bar 23 and the end of which arm 22 when the shaft 16 is rocked to the position shown in full lines in Fig. 3 under runs the end of a rocking beam 24 and comes into position to be engaged by a shoulder 25 on said beam as shown in Fig. 4, by which engagement of the arm 22 with the

shoulder 25 the shaft 16 is held against turning under tension of the spring 26. The pressure of the end of the latch arm 22 against the shoulder 25 should not be so great as to interfere with the movement of the beam 24 under the influence of the check, as hereinafter described; and in order that sufficient force may be exerted on the supporting plate 12 to effect a sufficiently forcible retraction of the brake without causing too great a pressure of the latch arm against the shoulder 25 in the construction shown, the latch arm is made considerably longer than the arm 15. The arm 15 and the latch arm thus form a lever which is engaged by the shoulder 25 at a point farther from its fulcrum than its connection with the plate 12. The other arm of the rocking beam 24 carries a coin tray or receptacle 27 in position beneath the lower end of a coin chute 28, and the beam is normally held in the position shown in Fig. 3 by means of an adjustable weight 29, such weight being sufficient to hold the beam normally in the position shown, but to be overbalanced by the coin or check delivered on the tray. When in this position the shoulder 25 is in position to engage the end of the latch arm 22 and hold the arm and the shaft in its normal movement by the spring 26. The beam 25 is shown as pivotally mounted in a support 30 extending upward from a base 31, and the end of the coin chute 28 is supported by a bracket 32 extending upward from the base plate 31, being clamped on said bracket by means of a strap 33.

When the phonograph is at rest the various parts are in the positions shown by full lines in the drawings, the operating parts being held against operation by the brake spring 10 bearing on the disk 11 and the reproducer arm having been returned to position to begin the reproduction of a record and having been lowered to its reproducing position by rotation of the content disk. The parts being in these positions, if a coin be dropped through the chute 28 on to the coin tray 27 the beam will thereby be rocked to raise the shoulder 25, thereby releasing the latch arm 22 and permitting the vertical shaft 16 to rock under the tension of the spring 26. By the rocking of the shaft 16, the arm 15 will be thrown to the position shown by dotted lines in Fig. 2, thereby moving the plate 12 from the position shown in full lines to that shown in dotted lines in Fig. 2. By such movement of the arm 15, the brake spring 10 will be retracted, moving out tangentially to and in contact with the periphery of the disk 11 and thereby imparting a starting movement to the disk, and then being moved entirely clear of the disk to permit the disk to rotate and the rest of the operating mechanism of the phonograph to op-

crate under the influence of the motor spring, the mandrel *a* rotating to rotate the record cylinder carried thereby and the feed screw *d* rotating to feed the reproducer carrier longitudinally of the mandrel to carry the reproducer over the rec. *d*. The reproducing operation of the phonograph will continue until, as the reproducer arm or carrier reaches the end of its reproducing movement, the lever *v* is moved to carry the insulating block *r*² from beneath the end of the contact spring *t*, thereby closing the circuit to the electric motor *E*. The electric motor will then operate to rewind the spring motor and to rotate the return feed screw *i*, thereby causing the reproducer arm or carrier to be raised and returned to its normal or starting position, as hereinbefore explained. During the return movement of the reproducer carrier, the finger 21 will engage the arm 20 and move the same from the position shown in dotted lines to that shown in full lines in Fig. 2, thereby turning the shaft 16 against the tension of the spring 26 and returning the latch arm 22 to position to be engaged again by the shoulder 25 on the beam 24, in which position it will then be held by the shoulder 25, the coin having fallen from the inclined tray 27 and the position of the beam being again determined by the weight 29. By such rocking of the shaft 16, the arm 15 and thereby the plate 12 will be returned to the positions shown by full lines in Fig. 2, and by such return movement of the plate 12 the brake spring 10 will be carried again into contact with the periphery of the disk 11, thereby stopping the rotation of said disk and the operation of the motor *A* and parts driven thereby. The electric motor will then continue to operate until, when the cam disk *s* has made a complete rotation, the spring contact *f* drops from the end of the high point of the cam disk thereby opening the motor circuit and coming to rest on the insulating block *r*¹. The operation of the electric motor will then cease and the various operative parts of the entire machine will again be in their normal position of rest, the spring of the spring motor having been rewound in readiness for another operation.

It will be understood that the invention is not to be limited to the exact construction, arrangement and combinations of parts as shown in the drawings for the purpose of illustrating the invention and to which the foregoing description has been mainly confined, but that it includes various changes and modifications thereof within the claims. It will be understood also that the term "phonograph" is used herein as a broad term to include all sound reproducing machines to which the invention is or may be found applicable.

Features of invention contained in the

construction shown and not claimed herein are claimed in my divisional application No. 385,388 and in my Patents Nos. 879,589 and 859,114.

What is claimed is:—

1. The combination with a phonograph, and means for automatically returning the reproducer carrier to starting position, of a friction brake for engaging a rotary member to stop the operation of operating mechanism of the phonograph, means controlled by the return movement of the reproducer carrier for moving the brake into operative position, and means for moving the brake to release said rotary member and to impart a starting impulse thereto, substantially as described.

2. The combination with a phonograph having a motor for actuating the phonograph in reproducing a record, of a stop device for normally preventing operation of the phonograph, a spring for retracting the stop device to permit the phonograph to operate, means for holding the stop device in operative position and for releasing it to permit it to be retracted, and a second motor and connections for returning the stop device to operative position.

3. The combination with a phonograph having a motor for actuating the phonograph in reproducing a record, of a stop device for normally preventing operation of the phonograph, a second motor for storing power in the first said motor, means for retracting the stop device to permit the phonograph to operate, means controlled by the movement of a part actuated by the first motor for causing the second motor to operate to store power in the first motor, and means operated by the power of the second motor for causing said stop device to return to operative position.

4. The combination with a phonograph having a motor for actuating the phonograph in reproducing a record, of a stop device for normally preventing operation of the phonograph, means for retracting the stop device to permit the phonograph to operate, a second motor, automatic return mechanism actuated by the second motor for returning the reciprocating member of the phonograph to starting position, and means operated by the power of the second motor for causing the stop device to return to operative position.

5. The combination with a phonograph having a motor for actuating the phonograph in reproducing a record, of a stop device for normally preventing operation of the phonograph, means for retracting the stop device to permit the phonograph to operate, a second motor, automatic return mechanism actuated by the second motor for returning the reciprocating member of the phonograph

to starting position, and means controlled by the return movement of the reciprocating member of the phonograph for returning the stop device to operative position.

5 6. The combination with a phonograph having a motor for actuating the phonograph in reproducing a record, of a second motor, automatic return mechanism actuated by the second motor for returning the reciprocating member of the phonograph to starting position, a stop device for co-acting with a driven member to stop the operation of operating mechanism of the phonograph, and means operated by the power of the second motor for moving the stop device into operative position after the completion of a reproducing operation of the phonograph.

7. The combination with a phonograph having a motor for actuating the phonograph in reproducing a record, of a second motor, automatic return mechanism actuated by the second motor for returning the reproducer carrier of the phonograph to starting position, a stop device for co-acting with a driven member to stop the operation of operating mechanism of the phonograph, and means operated by the reproducer carrier on its return movement for moving the stop device into operative position.

8. The combination with a phonograph having a spring motor for actuating the phonograph in reproducing a record, of an electric motor, automatic return mechanism actuated by the electric motor for returning the reproducer carrier of the phonograph to normal position, a stop device for co-acting with a driven member to stop the operation of operating mechanism of the phonograph, and means operated by the reproducer carrier on its return movement for moving the stop device into operative position.

9. The combination with a phonograph having a motor for actuating the phonograph in reproducing a record, of a second motor, automatic return mechanism actuated by the second motor for returning the reciprocating member of the phonograph to normal position, a friction brake for engaging a driven rotary member to stop the operation of operating mechanism of the phonograph, and means operated by the power of the second motor for moving the brake into operative position.

10. The combination with a phonograph having a motor for actuating the phonograph in reproducing a record, of a second motor, automatic return mechanism actuated by the second motor for returning the reproducer carrier of the phonograph to normal position, a friction brake for engaging a driven rotary member to stop the operation of operating mechanism of the phonograph, and means controlled by the return movement of the reproducer carrier for moving the brake into

operative position during such return movement.

11. The combination with a phonograph having a spring motor for actuating the phonograph in reproducing a record, of an electric motor for rewinding the spring motor, return mechanism actuated by the electric motor for causing the reciprocating member of the phonograph to be returned to normal position, a stop device for normally preventing operation of the phonograph under the influence of the spring motor, means for moving said stop device to permit the phonograph to operate, means controlled by the movement of a part actuated by the spring motor for closing the circuit to the electric motor after the phonograph has made a predetermined operation, and means actuated by the reciprocating member of the phonograph on its return movement for causing said stop device to be returned to operative position.

12. The combination with a phonograph having a spring motor for actuating the phonograph in reproducing a record, of a stop device for normally preventing operation of the phonograph under the influence of the spring motor, an electric motor for rewinding the spring motor, means for retracting said stop device to permit the phonograph to operate, means controlled by the movement of a part actuated by the spring motor for closing the circuit to the electric motor after the phonograph has made a predetermined operation, adjustable means for determining the amount of operation of the phonograph after which the circuit to the electric motor shall be closed, and means for returning the stop device to operative position after the completion of the predetermined operation of the phonograph.

13. The combination with a phonograph having a spring motor for actuating the phonograph in reproducing a record, of an electric motor for rewinding the spring motor, return mechanism actuated by the electric motor for causing the reciprocating member of the phonograph to be returned to normal position, a stop device for normally preventing operation of the phonograph under the influence of the spring motor, means for moving said stop device to permit the phonograph to operate, means controlled by the movement of a part actuated by the spring motor for closing the circuit to the electric motor after the phonograph has made a predetermined operation, and means operated by the power of the electric motor for causing the said stop device to be returned to operative position.

14. The combination with a phonograph having a spring motor for actuating the phonograph in reproducing a record, of a stop device for normally preventing operation of the

phonograph under the influence of the spring motor, a second motor for rewinding the spring motor, means for retracting the stop device to permit the phonograph to operate, 5 means controlled by the movement of a part actuated by the spring motor for causing the spring motor to be rewound by the second motor after the phonograph has made a pre-determined operation, and means operated 10 by the power of the second motor for causing

said stop device to return to operative position.

In testimony whereof, I have hereunto set my hand, in the presence of two subscribing witnesses.

WILLIAM W. ROSENFELD.

Witnesses:

A. L. KENT,
T. F. KEHOE.

H. SCHRÖDER.

PHONOGRAPH.

APPLICATION FILED MAY 14, 1908.

919,252.

Patented Apr. 20, 1909.

2 SHEETS—SHEET 1.

Fig. 1.

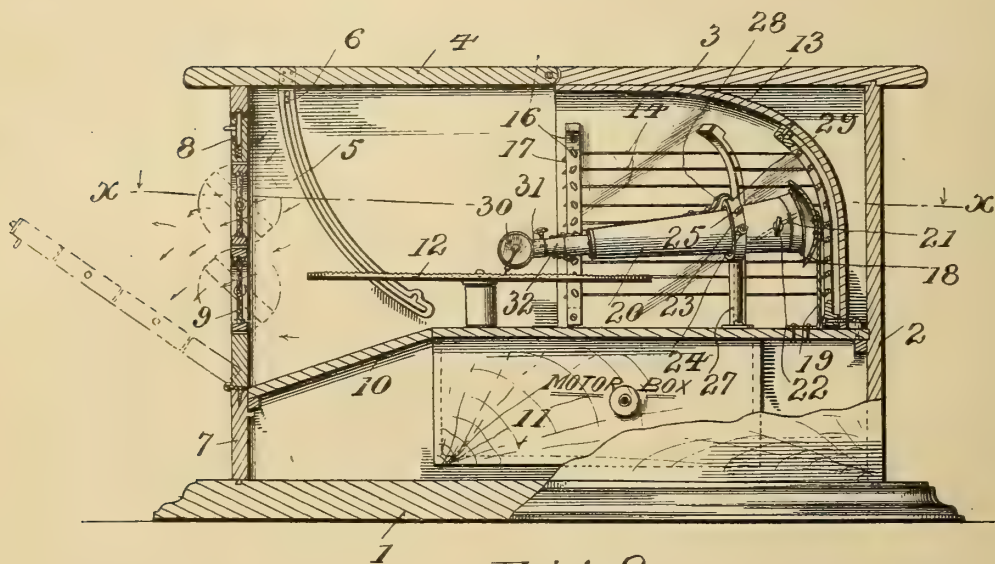
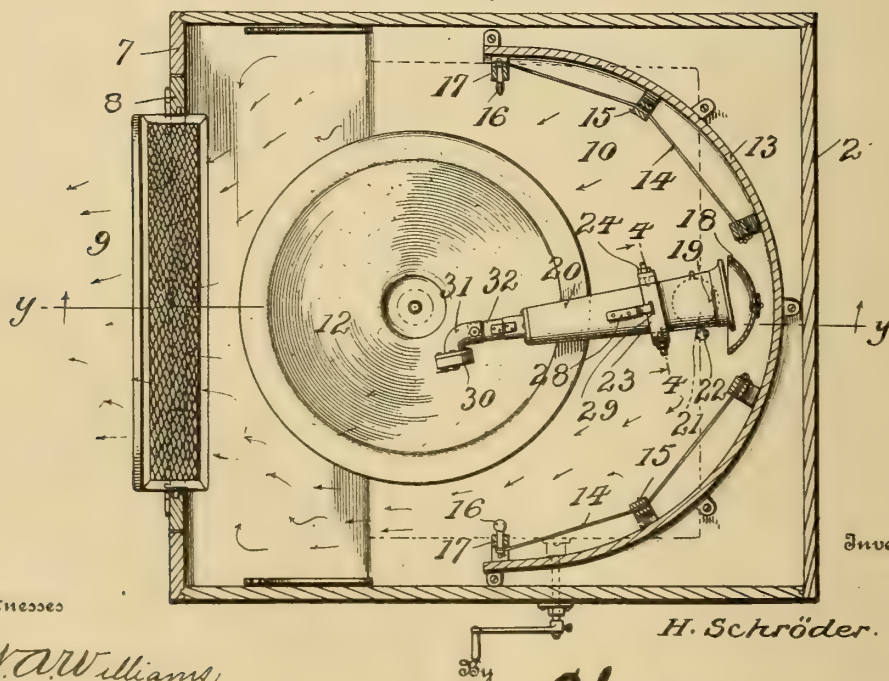


Fig. 2.



Inventor

Witnesses

W. A. Williams

W. A. Hodson

H. Schröder.

Hammer, Attorneys

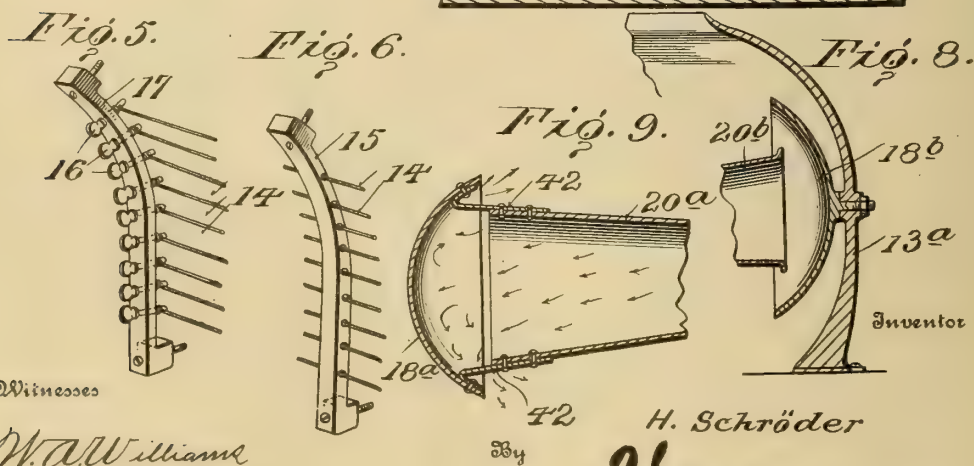
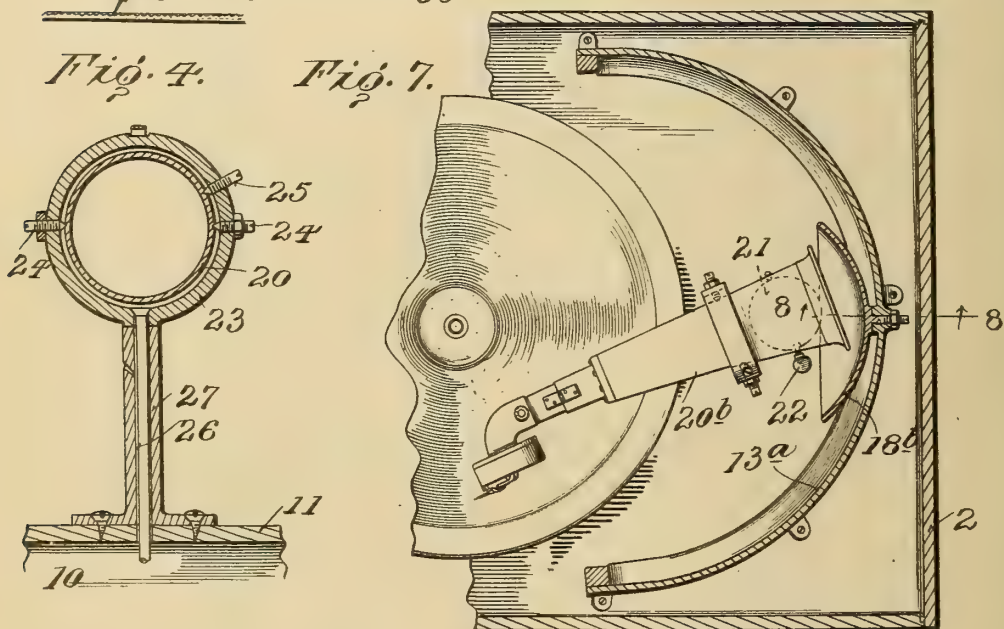
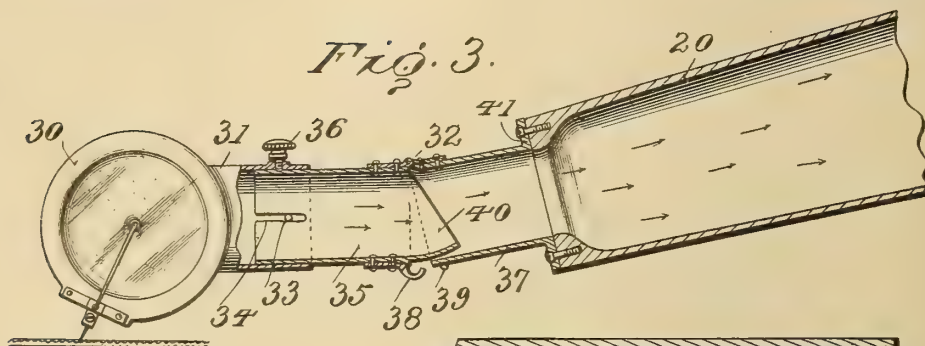
H. SCHRÖDER.
PHONOGRAPH.

APPLICATION FILED MAY 14, 1908.

919,252.

Patented Apr. 20, 1909.

2 SHEETS—SHEET 2.



Witnesses

W. A. Williams

W. P. Woodson

H. Schröder

Thammy, Attorneys

UNITED STATES PATENT OFFICE.

HERMANN SCHRÖDER, OF NEW YORK, N. Y.

PHONOGRAPH.

No. 919,252.

Specification of Letters Patent.

Patented April 20, 1909.

Application filed May 14, 1908. Serial No. 432,929.

To all whom it may concern:

Be it known that I, HERMANN SCHRÖDER, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Phonographs, of which the following is a specification.

This invention comprehends certain new and useful improvements in sound reproducing or talking machines, and the invention has for its object an improved construction of graphophone of that type in which the megaphone or horn is dispensed with, and in which the sound reproducing and amplifying means are inclosed within a case or cabinet. And a further object of the invention is a machine of this character which embodies a novel and advantageous construction and arrangement of parts whereby the sound may be intensified and mellowed or sweetened, and characterized by a high degree of resonance, avoiding any of the harsh, metallic effects which are incidental to the ordinary graphophone.

With these and other objects in view, as will more fully appear as the description proceeds, the invention consists in certain constructions, arrangements and combinations of the parts that I shall hereinafter fully describe and then point out the novel features of construction in the appended claims.

For a full understanding of the invention, reference is to be had to the following description and accompanying drawings in which:

Figure 1 is a longitudinal sectional view on the line $y-y$ of Fig. 2 of a talking machine embodying the improvements of my invention; Fig. 2 is a horizontal sectional view thereof on the line $x-x$ of Fig. 1; Fig. 3 is a detail sectional view and side elevation of the sound arm; Fig. 4 is a detail transverse section through the support for the sound arm. Figs. 5 and 6 are detail perspective views of the bars for holding the sympathetic strings. Fig. 7 is a fragmentary sectional view of a modified form of the instrument. Fig. 8 is a detail sectional view on the line 8-8 of Fig. 7; and, Fig. 9 is a detail sectional view of a modified form of sound arm.

Corresponding and like parts are referred to in the following description and indicated

in all the views of the drawings by the same reference characters.

The case or cabinet of my improved graphophone embodies a bottom 1, a back 2, a top 3 having a hinged lid or cover 4 that may be held in raised position by means of slotted members 5 engaging the studs 6, and a front 7 through which the sound is emitted and which is provided with a hinged door 8 preferably provided with one or more shutters 9 designed to regulate or control the volume of sound.

The cabinet is divided by a horizontal partition 10 into lower and upper compartments, the motor case 11 being located in the lower compartment, while the other parts of the apparatus are supported by and on the partition or platform 10 in the upper compartment.

12 designates the turn table for the record disk.

The sound mellowing and amplifying means of the present invention include a sound-board 13 which is supported upon the platform 10 within the cabinet at the rear end thereof and which may be of dome shape as clearly indicated in Figs. 1 and 2. This sound-board may be formed of any substance or material suitable for increasing and rendering resonant and mellow the sound waves as they are emitted from the sound arm of the instrument, and sympathetic strings 14 preferably extend around the interior of the sound-board 13, said strings being held in place intermediate of their ends by being passed through openings formed in bars 15 secured at their upper and lower ends within the sound board and vertically disposed therein, the said strings being held in position by tuning pegs 16 mounted on corresponding bars 17 at or near the ends of the sound-board. Within the dome shaped sound-board 13 is a bell 18 which is shaped as the segment of a sphere and which is supported in an elevated position spaced from the inner wall of the sound-board by being supported upon the upper end of a bracket 19, the lower end of the bracket being secured by screws or the like to the platform 10.

The sound waves are intended to be directed against the bell 18 and the sound-board 13, or against the latter only if the bell is not used, by means of a sound arm 20 which points rearwardly as shown, the rear end of said sound arm being preferably flared

or bell shaped and being preferably provided with a damper 21 in the form of a disk pivotally mounted within the sound arm and capable of being adjusted by means of a small button or knob 22 so as to regulate the volume of sound issuing from the sound arm. The sound arm 20 is mounted within and supported by a ring 23, pivot screws 24 being mounted in said ring in diametrical relation to each other and extending inwardly so as to impinge against the sound arm to support the same so that the sound arm may be turned to a limited extent about a horizontal axis.

25 designates a set screw which passes through the ring 23 and is designed to impinge against the sound arm and hold it if desired, relatively stationary as against this pivotal movement, and at any desired inclination. The ring 23 is mounted on the upper end of a vertically disposed shaft 26 which is designed to be turned by a self feed apparatus (not shown) operatively connected to the motor so as to swing the sound arm laterally over the upper face of the record disk as the turn table 12 rotates. The shaft 26 is mounted within a hollow post 27 which extends upwardly from and which is secured at its base to the platform 10 between the turn table 12 and the sound board 13.

28 designates a snap spring which is secured to the sound arm 20 and which is adapted to spring into engagement with a lug or catch 29 on the ring 23 so as to hold the outer or forward end of the sound arm in an elevated position whenever desired, to insert a stylus in the sound box 30 or to remove a stylus therefrom.

The sound box 30 is secured in any desired manner to the outer end of an elbow which in one embodiment of the invention comprises an outer section 31 and an inner section 32 detachably connected together.

The outer section 31 is formed at its inner end with two inwardly projecting pins 33 designed to slide inwardly in longitudinal grooves 34 formed in the outer end of the member 35 of section 32 so as to properly direct the section 31 to its place as it is slipped over the member 35. After these parts have been slipped one over the other, they are secured together by means of a thumb screw 36 as shown. The section 32 of the elbow comprises the hinged section 35 and the relatively stationary section 37 to which the section 35 may, if desired, be rigidly connected at will by means of a snap spring 38 engaging the catch or lug 39.

40 designates an extension which is formed on the hinged member 35 and which is adapted to fit within the member 37 of the hinged section 32 so as to prevent the escape of the sound waves during the independent movement of the member 35. The member

37 of the section 32 is formed with a flange 41 by which the elbow may be secured by screws or other fastening means to the outer end of the sound arm 20.

In the practical operation the set screw 25 may be disengaged from its contact with the sound arm 20 so as to permit the entire arm to have a free vertical movement together with the sound box carrying elbow in which event the spring 38 is engaged with the catch 39, or if desired, the set screw 25 may be applied so as to hold the sound arm 20 at the desired adjustment in the ring 23 and the snap spring 38 disengaged from the catch 39 so as to permit the elbow alone to move freely vertically as the arm, elbow and sound box are swung laterally over the upper surface of the record disk as the latter rotates. The sound waves passing through the sound arm 20 will be directed into the sound board 13 and also against the bell 18, if the bell be used, said waves being thereby amplified and passing outwardly in increased volume through the front of the cabinet. The sound board 13 and bell 18, will, however, either separately or jointly increase the resonance of the sound waves and the said sound waves will be mellowed thereby as well as by the sympathetic strings 14 which will be set to vibrating.

If desired, the bell 18^a may be secured directly to the rear end of the sound arm 20^a in spaced relation thereto as by means of brackets 42, as illustrated in Fig. 9 so as to move with the sound arm. Or, if desired, the sound board may be constructed as illustrated in Figs. 7 and 8 wherein 13^a designates the sound board as regularly curved around the rear end of the cabinet and 18^b the bell secured directly to the sound-board, the sound waves being brought into the bell by means of the taper arms 20^b.

Having thus described the invention, what is claimed as new is:

1. In a sound reproducing machine, the combination of a cabinet embodying inclosing sides, rear, front and a top of a forwardly facing sound board mounted in the rear end of the cabinet and curving from side to side thereof, a sound arm pointed rearwardly toward the sound board, and a sound box carried on the free end of said arm.

2. In a sound reproducing machine, the combination of a forwardly facing sound board, a support therefor, a forwardly facing bell secured within the sound board, and a sound arm pointing toward the bell.

3. In a sound reproducing machine, the combination of a forwardly facing sound board, a support therefor, a forwardly facing bell secured within the sound board and relatively smaller than said board, a sound arm pointing toward the bell with its rear end in proximity thereto, and a sound box carried on the front end of said sound arm.

4. In a sound reproducing machine, the combination of a rearwardly extending sound arm, a support therefor, on which the sound arm is mounted for a vertical movement, means for rigidly connecting the sound arm and its support, an elbow secured to the end of said sound arm and arranged for a vertically yielding movement independent of the sound arm, means for rigidly holding said elbow as against such independent movement, and a sound box carried by said elbow.

5. In a sound reproducing machine, the combination of a sound arm, an elbow secured to one end of said sound arm and embodying hinged members one of which is provided with a snap spring and the other with a catch designed for connection with said spring whereby to hold the members rigidly together, and a sound box carried by said elbow.

6. In a sound reproducing machine, the combination of a forwardly facing sound board, a support therefor, a rearwardly facing sound arm mounted within the sound board, a sound box carried by the front end of said sound arm, and a bell secured to the rear end of the sound arm in spaced relation thereto.

7. In a sound reproducing machine, the combination of a dome shaped sound board, vertically disposed bars within said sound board, tuning pegs mounted on said bars, sympathetic strings secured to said tuning pegs, and intermediate bars secured to the inner wall of the sound board between the

first named bars and formed with openings through which the springs extend.

8. In a sound reproducing machine, the combination of a dome shaped sound board, vertically disposed bars within said sound board, and sympathetic strings secured to said bars.

9. In a sound reproducing machine, the combination of a cabinet embodying a bottom, top, back and sides, a horizontal partition within the cabinet dividing it into upper and lower compartments, a box or case secured in the lower compartment, a turntable mounted in the upper compartment, a rearwardly facing sound arm mounted in the upper compartment, a sound box carried by the front end of said sound arm, and a dome shaped sound board mounted in the rear end of the upper compartment and extending from the partition to the top of the cabinet and from side to side thereof, the rear end of the sound arm facing the sound board.

10. In a sound reproducing machine, the combination of a forwardly facing sound board, sympathetic strings secured within said sound board, a bell secured within the board in front of said strings, and a sound arm with an open end pointing toward the bell.

In testimony whereof I affix my signature in presence of two witnesses.

HERMANN SCHRÖDER. [L. S.]

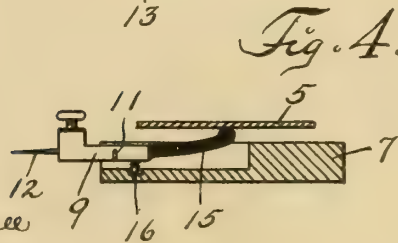
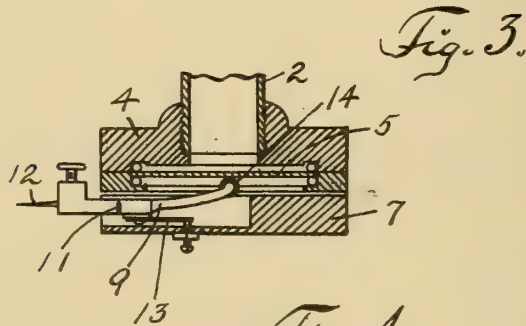
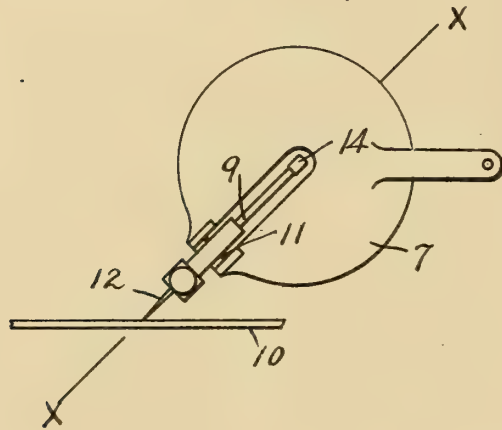
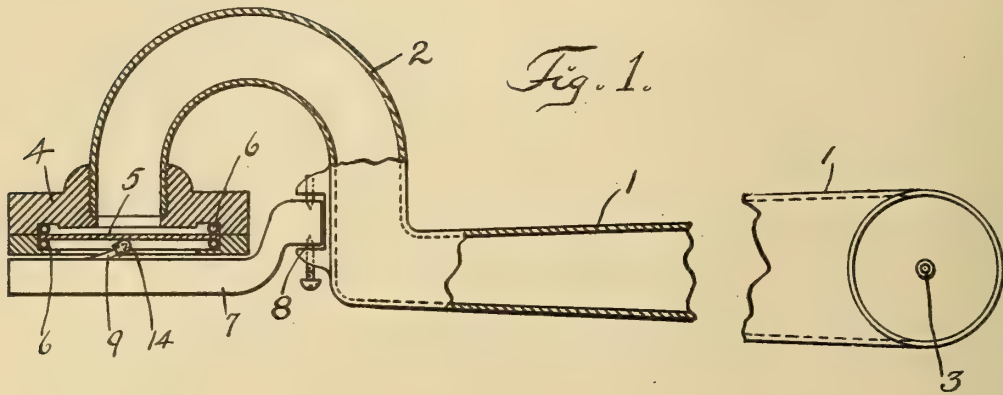
Witnesses:

CORA WIESAND,
MALWINE VON DER OSTEN.

J. NOLL.
 APPARATUS FOR REPRODUCING SOUND.
 APPLICATION FILED SEPT. 16, 1908.

919,293.

Patented Apr. 20, 1909.



WITNESSES:
 David M. Edsall
 Lillian Blom

INVENTOR
 John Noll

BY
 Townsend & Secker
 ATTORNEYS.

UNITED STATES PATENT OFFICE.

JOHN NOLL, OF BROOKLYN, NEW YORK, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO EMPIRE TALKING MACHINE COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

APPARATUS FOR REPRODUCING SOUND.

No. 919,293.

Specification of Letters Patent.

Patented April 20, 1909.

Application filed September 16, 1908. Serial No. 453,365.

To all whom it may concern:

Be it known that I, JOHN NOLL, a citizen of the United States, and a resident of Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Apparatus for Reproducing Sounds, of which the following is a specification.

My invention relates to sound reproducers for talking machines, such as phonographs, gramophones and the like.

Briefly stated, the principal object of my invention is to attain a perfectly clear and true reproduction of the original from which the record was made, without having any of the scratch or rubbing sound, due to the movement of the stylus and the record, reach the sound box and to also insure that the diaphragm in the sound box will be acted upon by the stylus lever to the exact extent necessary to reproduce perfectly the desired sound as recorded on the record.

To these ends my invention consists first, in a sound reproducing apparatus consisting of a sound-box and its attendant stylus lever, wherein the stylus lever is mounted on a support independent of the sound-box and adapted to engage the diaphragm in the sound-box. By this construction, the weight of the sound box is prevented from resting on the stylus and also any direct connection between the stylus lever and the sound-box is avoided whereby the scratch due to the travel of the stylus on the record will not be transmitted to the sound box. Also as there is no fixed connection between the stylus and the sound-box, the sound box as a whole will not vibrate with the movements of the stylus lever.

My invention also consists in the employment of a non-sound conducting or sound insulating material between the stylus or the record and the diaphragm, in combination with the independently mounted stylus lever. The object of this construction is to absolutely insulate the sound-box from any scratching sounds due to the travel of the stylus needle on the record.

My invention consists also in the details of construction and combinations of parts hereinafter more particularly described and then specified in the claims.

In the apparatus heretofore employed such as commonly called gramophones, the sound box is mounted on a gravity arm,

that is, an arm which swings vertically, and the stylus carrying lever is pivoted directly to the sound-box. This construction has various serious defects, among them being the metallic mounting of the stylus lever on the sound box whereby the scratch of the stylus needle is transmitted to the sound box. Another defect is that the entire weight of the sound box falls on the stylus needle which causes it to press into the record and cause the scratching sound and also unduly cuts the record. A further defect is, as the gravity arm carrying the sound box is also necessarily capable of swinging about a vertical axis to follow the record, the gravity arm and sound box vibrate or move bodily with the movements of the stylus lever which prevents the end of the stylus lever which bears against or is secured to the diaphragm from vibrating the diaphragm to the proper extent to obtain the full sound which is impressed on the record or to the extent that it would be vibrated were it held still and not subject to any movement other than the impulse impressed on it by the free end of the stylus lever, or the end of the stylus lever which is secured to it. In other words, the diaphragm is moved bodily at the same time that it is buckled by the end of the stylus lever, thus either decreasing or increasing the extent of its buckling due to the movement of the stylus lever which either accentuates or decreases the height of the sound wave and does not cause the exact sound to be emitted which is impressed on the record.

The above defects are remedied by constructing the apparatus according to my invention and as hereinafter described more in detail.

In the accompanying drawings, Figure 1 is a plan and partial section of a sound reproducing arm constructed in accordance with my invention. Fig. 2 is a side elevation of the gravity arm viewed from the inside. Fig. 3 is a section taken on the line X X Fig. 2 and also includes a section through the sound box. Fig. 4 illustrates a modification in the construction of the stylus lever.

In the preferred form of carrying out my invention as applied to talking machines, such as a phonograph or a gramophone, 1 indicates a hollow arm having a hollow goose neck 2 rigidly secured thereto. The arm 1 is pivotally mounted to swing about a

vertical axis as is usual, said axis being indicated at 3, but is otherwise held rigid. Hereinafter this arm 1 and goose-neck 2 will be termed a rigid arm, by "rigid" being meant that it is not capable of an up and down movement as is usual for this arm to have in its employment in talking machines. A sound-box 4 secured to the open end of the goose-neck 2 is provided with the usual diaphragm 5 suitably held therein by means of rubber rings 6 as is usual in the art.

7 indicates a gravity arm preferably pivotally mounted on the rigid arm 1 as at 8, and adapted to move in a plane parallel with the diaphragm 5, the said gravity arm carrying the stylus lever 9 for transmitting the waves from the record 10 to the diaphragm 5. The stylus lever 9 is secured to the arm 7 and fulcrumed on a knife edge 11 as is usual in this art, one end being provided with the usual stylus 12 for following the record 10, the other or free end being held in contact with the diaphragm 5 by means of an adjustable spring 13 as more clearly shown in Fig. 3, the spring acting on the lever between the knife edge 11 and the end which bears against the diaphragm 5. The end of the lever 9 preferably merely presses against the diaphragm and is not secured thereto. Interposed between the lever 9 and the diaphragm is a piece of dead material or a substance which is a very poor conductor of sound or a sound insulator such as, for instance, a piece of rubber 14 secured to the end of the lever 9 and located between the end of the lever and the diaphragm. Obviously other ways of inserting a poor sound conductor between the stylus and the diaphragm might be employed, another form being illustrated in Fig. 4 in which the entire end of the lever which bears against the diaphragm is constructed of a poor sound conductor such as hard rubber as indicated at 15. Also in this figure a modification in the form of spring for pressing the lever against the diaphragm is shown, it being in the form of a spiral spring 16 located between the fulcrum and the end bearing against the diaphragm.

10 The gravity arm 7 is constructed with a sufficient quantity of metal to dissipate any sound of the stylus on the record transmitted to it, due to the metallic mounting of the stylus lever thereon and the scratch will therefore not reach the hollow arm 1 or at least not to any noticeable extent.

My invention is not limited to the ways of inserting the non-sound conducting material between the stylus and the diaphragm nor to any particular material, but broadly covers the employment of any poor sound conducting material between the stylus and the diaphragm. My invention is also not limited to the exact construction shown and described, it being capable of various modifi-

cations and uses to adapt it to different types of machines without departing from the spirit of my invention, the one shown merely serving to illustrate the invention.

What I claim as my invention is:—

1. In an apparatus for reproducing sound, the combination of a sound-box, a diaphragm mounted in said sound-box and a stylus lever mounted on an arm pivoted independent of said sound-box, said lever being adapted to engage said diaphragm.

2. In an apparatus for reproducing sound, the combination of a sound-box, a diaphragm mounted therein, a stylus lever mounted on an arm independent of said sound-box and means for keeping one end of said lever pressed against said diaphragm.

3. In an apparatus for reproducing sound, the combination of a diaphragm, an arm pivoted to move in a plane parallel with said diaphragm and a stylus lever pivoted on said arm and cooperating with said diaphragm.

4. In an apparatus for reproducing sound, the combination of a sound-conducting rigid arm, a sound-box secured to said rigid arm, a diaphragm in said sound-box, a pivotally mounted gravity arm and a stylus lever mounted on said gravity arm adapted to engage said diaphragm.

5. In an apparatus for reproducing sound, the combination of a sound-conducting rigid arm, a sound-box secured to said rigid arm, a diaphragm in said sound-box, a gravity arm pivotally mounted on said rigid arm and a stylus lever adapted to press against said diaphragm.

6. In an apparatus for reproducing sound, the combination of a hollow sound-conducting rigid arm, a sound-box secured to said rigid arm, a gravity arm free of said sound-box and a stylus arm mounted on said gravity arm.

7. In an apparatus for reproducing sound, the combination of a sound-box provided with a diaphragm, means for supporting said sound-box, an arm pivoted on said means and a stylus lever carried by said arm and cooperating with said diaphragm.

8. In an apparatus for reproducing sound, the combination of a hollow rigid arm, a sound-box secured to said rigid arm, a diaphragm in said sound-box, a gravity arm pivotally mounted on said rigid arm and free from said sound-box, a stylus lever mounted on said gravity arm, and means for keeping one end of said stylus lever pressed against said diaphragm.

9. In an apparatus for reproducing sound, the combination of a hollow rigid arm, a sound-box secured to said rigid arm, a diaphragm mounted in said sound-box, a pivotally mounted gravity arm free from said sound-box, a stylus lever carried by said gravity arm and adapted to engage said dia-

phragm at one end and a spring acting on said stylus lever between its fulcrum and the end in engagement with the diaphragm to press said end against said diaphragm.

5 10. In an apparatus for reproducing sound, the combination, of a sound-box including a diaphragm, means for supporting said sound-box, an arm pivoted to said means and carrying a stylus contacting with but
10 sound insulated from said diaphragm.

11. In an apparatus for reproducing sound, the combination with a sound-box mounted on a sound conducting rigid arm and provided with a diaphragm, of a stylus lever
15 mounted free from said sound-box for actuating said diaphragm and a non-sound conducting material between the stylus and the diaphragm.

12. In an apparatus for reproducing sound, the combination with a sound-box mounted
20 on a sound conducting rigid arm and provided with a diaphragm, of a stylus lever mounted free from said sound-box for actuating said diaphragm and provided at one

end with a stylus and a non-sound conducting material secured to the other end and located between the end of the lever and the diaphragm. 25

13. In an apparatus for reproducing sound, the combination of a sound-box including a diaphragm, means for supporting said
30 sound-box, an arm pivoted to said means and carrying a stylus lever, said lever being provided with an arm of hard rubber.

14. In an apparatus for reproducing sound, the combination of a sound-box including a diaphragm, means for supporting said
35 sound-box, an arm pivoted to said means and carrying a stylus lever, one arm of said lever being constructed entirely of sound
40 insulating material.

Signed at New York in the county of New York and State of New York this 15th day of September A. D. 1908.

JOHN NOLL.

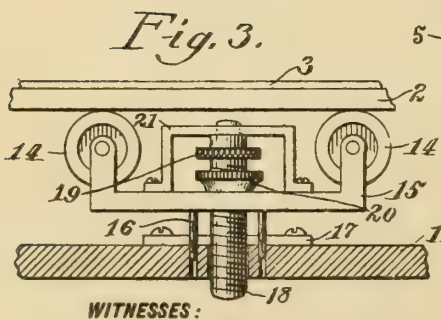
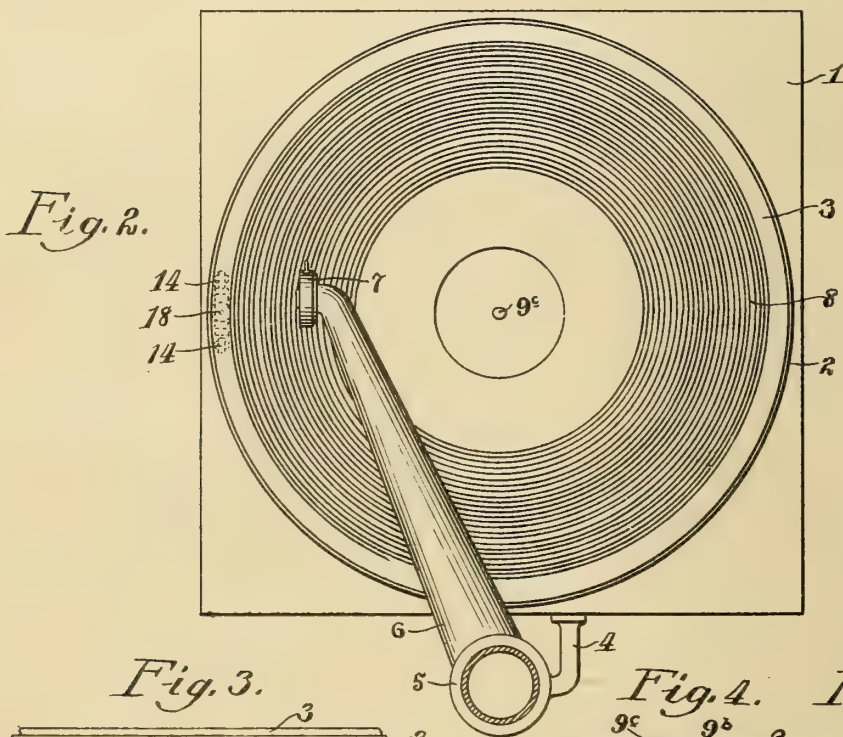
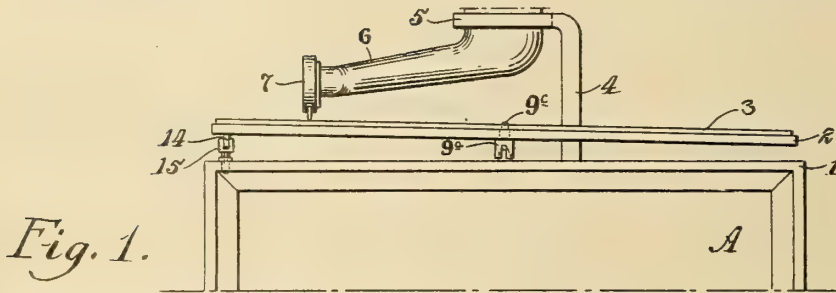
Witnesses:

LILLIAN BLOND,
C. F. TISCHNER, Jr.

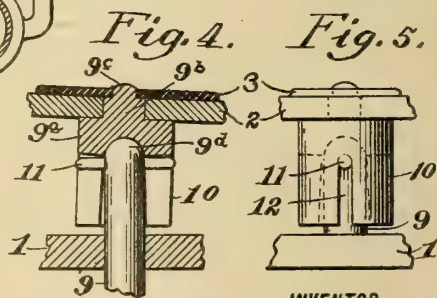
L. T. HAILE.
SOUND REPRODUCING MACHINE.
APPLICATION FILED DEC. 4, 1907.

919,856.

Patented Apr. 27, 1909.



R. M. Kiddell
H. Gamble



INVENTOR
Luther T. Haile
BY
H. V. Henton
ATTORNEY.

UNITED STATES PATENT OFFICE.

LUTHER T. HAILE, OF PHILADELPHIA, PENNSYLVANIA.

SOUND-REPRODUCING MACHINE.

No. 919,856.

Specification of Letters Patent.

Patented April 27, 1909.

Application filed December 4, 1907. Serial No. 404,993.

To all whom it may concern:

Be it known that I, LUTHER T. HAILE, a citizen of the United States, residing in the city of Philadelphia, State of Pennsylvania, have invented certain new and useful Improvements in Sound-Reproducing Machines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to sound-reproducing machines of the class of gramophones so-called, wherein a grooved disk-record rotated in a horizontal plane and over such record is operatively supported on the end of a pivotally-mounted sound-conveying arm, a reproducer comprising a sound-box and its stylus, the diaphragm of the reproducer being vibrated by a radially traversing contact of the stylus with the sound-grooves of the record. In all such devices as far as I am aware, the disk is and must be supported for rotation in a horizontal plane, the means for propelling the sound-box over the record being varied in the several types comprising the method described in Berliner's U. S. Patent No. 534,543 wherein the propulsive effect of the grooved surface of the rotating disk is solely relied upon, while in another type a screw-feed or other positively-acting feed device is employed, while in still another type means independent of the record and its actuating shaft are employed to impart a swinging movement to the pivotally-mounted arm itself which carries the reproducer and its stylus.

My method and means hereinafter described for causing the reproducer to be operatively carried over the disk-record is radically different in principle from any of the three types of mechanism above referred to, and is distinguished by a novel mode of operation, namely, that the operative movement of the reproducer, is effected by its own momentum after a moving impulse is first initiated and then continued by the rotation of the disk, the spiral groove in the disk operating to impart only a restraining effect on such movement in contradistinction to its usual propulsive effect.

In addition to the general and primary object stated, the purpose of my invention is to effect that object notwithstanding that the convolutions of the sound-groove may not happen to be of uniform depth or of uniform distance apart, also of insuring the full op-

erative tracking of the stylus in the sound-groove and particularly against the inner and sensitive wall thereof, the stylus being restrained thereby against too rapid gravital propulsion as before stated.

To these ends my invention consists of the combination in a talking machine comprising a spirally-grooved disk-record and a supporting turn table therefor, a sound-conveying arm pivotally-mounted in a plane above the record, a reproducer carried on the free end of said arm, with its stylus contacting by gravity with the grooves of the record, of means dependent solely on the rotative effect of the record to impart an initial impulse movement to the reproducer and then permit it to continue such movement, by its own momentum, save as restrained by its stylus tracking in the record groove and bearing at all times against the inner wall thereof, said means consisting of axially actuating devices operating primarily to rotate the record and secondarily to support it operatively in a horizontally-inclined plane during such rotation, said actuating and supporting devices being pivotally mounted on the head of a rotatable main shaft the axis of which is perpendicular; and my invention further comprises means coacting therewith, but independent thereof, operating to adjustably regulate the degree of inclination of the record-holder or turn-table.

In the accompanying drawings illustrating my invention, Figure 1 is a side elevation, with the lower part of the casing or motor box broken away, and Fig. 2 is a plan view thereof, Fig. 3 is a side elevation, partly in section, of the top of the motor, casing, the record and record holder, and the device to adjust the degree of inclination of the latter, Fig. 4 is a side elevation, partly in section, of the record, record holder, the divided actuating shaft, and the top of the motor box, and Fig. 5 is a side elevation of a preferred form of universal joint between the divided sections of the actuating shaft.

Referring now to the annexed drawings in which is illustrated one form in which my invention may be exemplified, A indicates the cabinet, while the numeral 1 indicates the top wall of the cabinet, 2 the turn table, and 3 the grooved disk record removably supported thereon, the upper face of which contains the usual sound grooves 8 in spiral form. The numeral 4 indicates a bracket or other like means on the cabinet side wall to ply-

otally-support, by a bearing such as 5, the swinging sound-conveying arm 6 on the free end of which is carried the reproducer 7 with its stylus.

5 The cabinet contains the usual motor, not shown, for rotating an axial shaft 9 the primary function of which is to rotate the turn table and record, its secondary function being to support or aid in supporting the record
10 in a horizontally-inclined plane, the highest point of inclination being that segment of the outer edge of the record over which is the free end of the pivotal arm 6 and its reproducer 7 when in initial position. The degree of in-
15 clination from the horizontal need be very slight, that is to say an incline in which the rotative movement of the disk would, without reference to its grooves, impart an im-
20 pulse movement to the pivotally-mounted arm and its reproducer. The means by which this may be effected, as illustrated in the drawings, wherein is shown the axial actu-
25 ating shaft 9 sectioned near its head end, in other words constructed in two parts with connecting actuating means between the
30 parts, such means being of the general nature of a ball and socket joint, whereby the upper and short section may be vertically inclined relatively to the perpendicular lower end,
35 and at same time be rotated thereby. In said drawings, the upper section of the shaft is indicated at 9^a (see Figs. 4 and 5) and the turn table 2 is fixedly mounted thereon by means of a head 9^b on the shaft section, said
40 head having on its end a head 9^c adapted to pass through a central aperture 10 in the disk record 3 by which the latter is removably supported in place on the turn table.

The lower end of the upper section 9^a of the shaft is formed as a longitudinally-bored
45 hood or connecting cap, to admit freely the upper end of the lower section 9 of the shaft. The head end of section 9 is rounded to conform to the shape of the rounded concavity
50 9^d in the interior of the upper section 9^a of the shaft; and the bored out hood or cap end is slotted longitudinally on opposite sides as at 12, Fig. 5, to admit a connecting actuating
55 pin 11 passing transversely through the upper end of the shaft section 9, see Fig. 4. It is obvious that this construction will allow the upper section 9^a of the shaft to be
60 slightly inclined from the vertical while being rotated by the shaft section 9. It is equally obvious that any well known form of ball and socket joint or universal joint may be substituted with like results, and also that such form of joints may be substituted as will not only permit the upper shaft section
65 9^a to assume a vertical incline during rotation, but will fixedly hold and support it in such inclined position relatively to the lower shaft section, during rotation. I prefer how-
ever to employ means separate from the shafts and their jointed actuating connec-

tion, to produce the required vertical incli-
70 nation of the shaft section 9^a and of the horizontal inclination of the turn table fixedly attached to such shaft section. Various means to accomplish this may be employed, as is manifest, but one of the best I know of, because of its capability of delicate adjust-
75 ment, is that shown in Fig. 3, which consists of a pair of rubber-tired wheels 14 mounted in spaced relation and supported, vertically adjustable, beneath a segmental surface of
80 the underside of the turn table, on that side of the cabinet top over which it rides in its highest plane. These wheels being in dupli-
85 cate, are therefore guiding as well as supporting devices, and they are mounted in a bracket 15, the underface of which has a pair of vertical pins 16 passing freely through ap-
90 ertures in the cabinet top 1 and through a plate 17 fixed thereon. Fastened to the top side of the bracket 15 and between the wheels 14, is a lifting plate 21 which affords a bearing for a lifting screw 18 provided with an
95 annular actuating surface 19. The lower end of this screw passing downward through the wheel bracket 15, between its guiding pins 16, through plate 17 and through the top wall of the cabinet, whereby the height of the wheel bracket, relatively to the turn
100 table may be adjusted; and a locking nut 20 is provided to set it when so adjusted.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:—

1. In a talking machine the combination
105 with a disk sound-record, a holder therefor, a movable tubular arm, reproducing mechanism carried on the free end thereof with its stylus resting by gravity on the surface of the record, of means dependent upon the ro-
110 tative movement of the record but independent of the grooves thereof, operating to automatically impart an impulse movement to the reproducer over the record in repro-
115 ducing direction and cause its stylus to track in the sound-grooves thereof, said means consisting of an actuating shaft, means to rotate it, and devices between the head of said shaft and the record holder operating to support and rotate said record holder in a
120 horizontally-inclined plane.

2. In a sound-reproducing machine of the type recited, the combination with a disk record having a sound-groove spirally formed thereon a holder therefor, a sound-conveying
125 arm pivotally mounted over and adjacent to said disk, a reproducer carried on the free end of said arm, of actuating devices consisting of a rotatable shaft, means to drive it, and a connecting pivotal support between the head of said shaft and the record holder, operating to support and rotate the disk
130 record in a horizontally-inclined plane and impart a gravity momentum to the reproducer-carrying arm about its pivotal axis to

carry the stylus radially across the record in reproducing direction, and in operative engagement with the sound-groove thereof, said mechanism being so constructed and

carrying a reproducing diaphragm with its stylus resting by gravity on said record, and a vertically extending axial driving shaft; the combination therewith of connecting 65
actuating devices between the head of said shaft and the turn table adapted to operatively support and rotate the same in a horizontally-inclined plane, whereby the reproducing mechanism is operatively pro- 70
pelled by its own momentum radially over the record and is adapted to be restored to potential position by restoring said elements to initial position.

10 3. In a talking machine, the combination with a rotatable disk-record-holder, means to rotate the same, a tubular sound-conveying arm pivotally mounted to swing radially over said record holder and record supported 15
thereon, a reproducing mechanism carried on the free end of said pivotally mounted tubular arm, of means operating to yieldingly impart to said reproducing mechanism a propulsive momentum over the record in 20
reproducing direction, save as restrained by its stylus tracking in the record groove, said means consisting of a longitudinally-divided actuating shaft, a universal joint between the sections thereof, with means to opera- 25
tively support the turn table on the upper of said shaft sections in a horizontally-inclined plane during its rotation.

7. In a machine of the class recited a disk 75
record whose operative grooved surface is in a single plane, and a sound-conveying arm, pivotally mounted, with a sound-reproducer carried on the free end thereof over and adjacent to said disk, the combination there- 80
with of mechanism co-acting with said disk in rotative motion and operating to impart an impulse movement to said reproducer-carrying arm, in a sidewise direction and in a plane substantially parallel with that of the 85
operative face of said disk, said means constituting actuating devices to pivotally support and rotate said record carrier and disk at an inclination to the horizontal, with means to adjustably regulate the angle of inclination 90
thereof to decrease or increase the impulse movement of the reproducer and maintain it in any desired degree of operative contact with the groove of the record.

4. In a talking machine a rotatable record- 1
holder and an axial actuating shaft therefor, 30
a disk record supported on said holder and whose upper surface lies in a single plane and has a laterally undulating record groove, the combination therewith, of means between the head of said shaft and the record- 35
holder operating to guidingly support and rotate the latter in a horizontally-inclined plane, a movable tubular sound-conveying arm, with reproducing mechanism carried on the free end thereof and comprising a 40
stylus normally engaging, in initial position, the exterior convolution of the sound-groove of said disk record in its highest plane of rotation.

8. In an instrument of the class recited, a 95
motor, a vertically-extending actuating shaft, a record-carrier, a disk record supported on said carrier, connecting actuating means be- 100
tween the head of said shaft and the record carrier operating to pivotally support and rotate said record-carrier and record in a plane 105
inclined from the horizontal, with devices to adjustably regulate the planular inclination of record carrier, a pivotally-mounted sound-conveying arm, a reproducer including a 110
stylus, carried on the free end of said arm, and resting by gravity on the record, whereby on the rotation of the inclined record holder the reproducer has imparted to it an 115
impulse movement radially over the record, and is restrainingly governed in such movement by the stylus tracking in the record grooves and bearing against the inner walls thereof.

5. In a talking machine the combination 45
with an axial actuating shaft, a turn table rotated thereby, a disk-record supported on said turn table, with reproducing mechanism including a stylus, resting by gravity there- 50
on, of a universal joint between the head of said shaft and the turn table, with means to cause said shaft to horizontally incline the turn table on its axis during its rotation by the shaft, whereby the reproducing mechanism is automatically propelled by its own 55
momentum over the record and its stylus caused to track in and be restrained by the record groove throughout its several convolutions.

In testimony whereof, I have hereunto 115
affixed my signature this 30th day of November A. D. 1907.

LUTHER T. HALL

Witnesses:

A. M. BIDDLE.

H. T. FENTON.

6. In a talking machine a turn-table, a 60
disk sound-record operatively supported thereon, a pivotal mounted tubular arm

C. F. HAMILTON.
 PHONOGRAPH.
 APPLICATION FILED DEC. 30, 1908.

920,134.

Patented May 4, 1909.

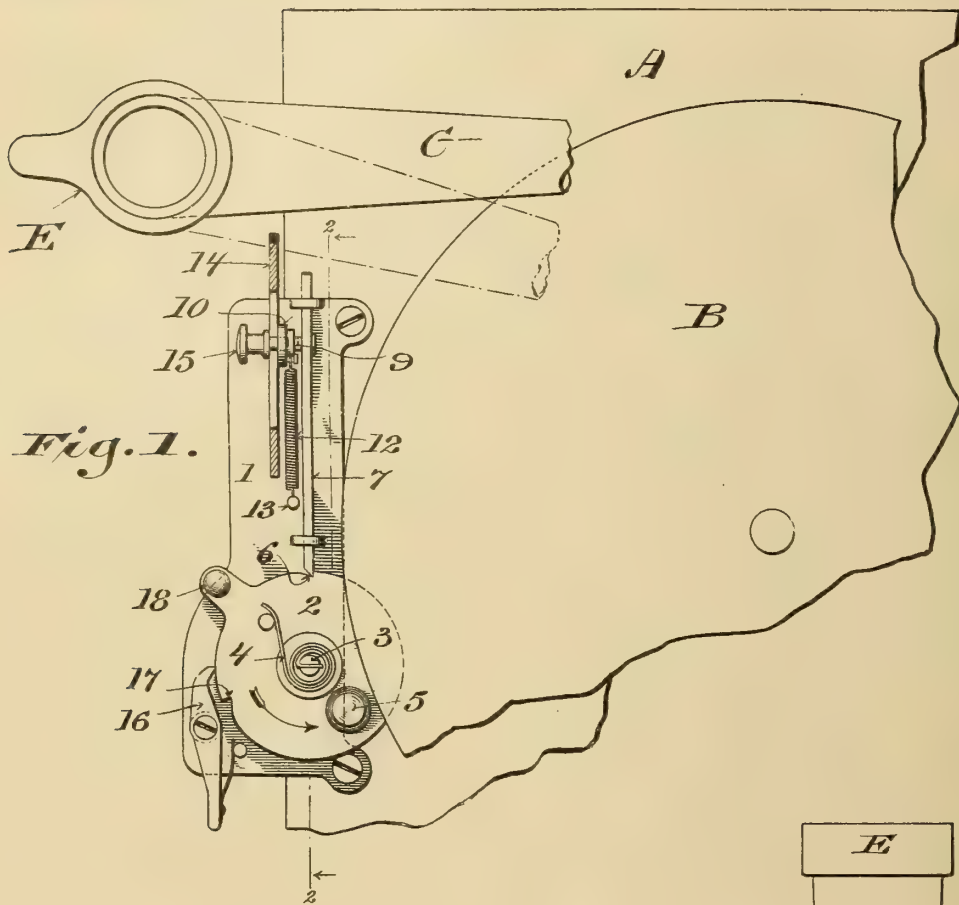


Fig. 1.

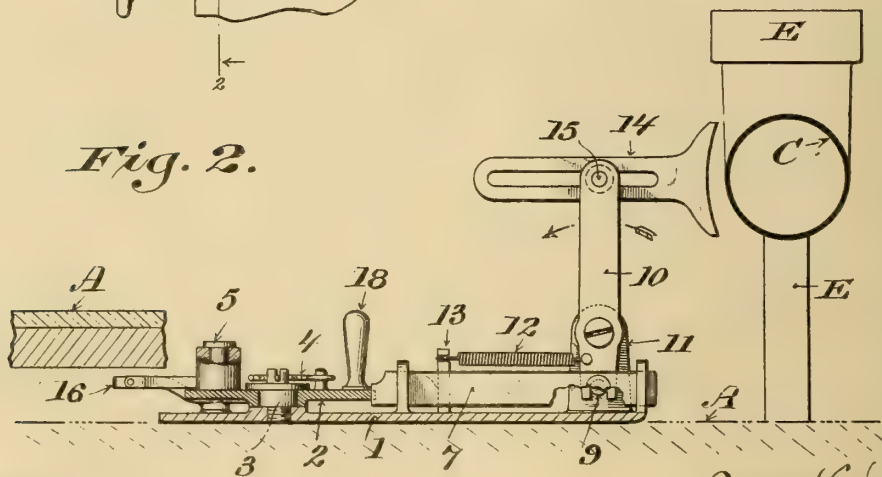


Fig. 2.

Witnesses:
 George L. Feller
 Frank W. Rogers

Inventor:
 Claude F. Hamilton.
 By *Clifford Young*
 Attorneys

UNITED STATES PATENT OFFICE.

CLAUDE F. HAMILTON, OF ATHENS, WISCONSIN, ASSIGNOR OF ONE-HALF TO JOHN C. NUERNBERG, OF ATHENS, WISCONSIN.

PHONOGRAPH.

No. 920,134.

Specification of Letters Patent.

Patented May 4, 1909.

Application filed December 30, 1908. Serial No. 470,081.

To all whom it may concern:

Be it known that I, CLAUDE F. HAMILTON, a citizen of the United States, and resident of Athens, in the county of Marathon and State of Wisconsin, have invented certain new and useful Improvements in Phonographs; and I do hereby declare that the following is a full, clear, and exact description thereof.

The object of my invention is to provide simple and durable automatic stop-mechanism for disk phonographs or like instruments, the stop-mechanism being controlled by the swinging-arm with which said instruments are provided, whereby the disk is checked against rotation when the swinging-arm has reached the end of the record upon said disk.

The invention therefore consists in certain peculiarities of construction and combination of parts as hereinafter described in connection with the accompanying drawings and subsequently claimed.

In the drawings: Figure 1 represents a plan view of so much of a disk phonograph as is necessary to illustrate its connection with an automatic stop-mechanism, embodying the features of my invention, which stop-mechanism is shown attached to the box of the phonograph with parts broken away and parts in section, to more clearly define the structural features, and Fig. 2, a sectional elevation of the same, as indicated by line 2—2 of Fig. 1.

Referring by characters to the drawings, A indicates a portion of a phonograph-box containing the driving-mechanism of a record disk B, and C indicates the usual swinging-arm, which arm carries the diaphragm-head, (not shown) the arm being swiveled in a standard E attached to the box. Secured to the top of the box A, is a base-plate 1, upon which is revolubly mounted a wrist-plate 2, the latter being trunnioned upon a stud 3, fast in the base-plate, and provided with a kerfed head for the reception of one end of a delicate flat coiled spring 4. The spring is wound under slight tension and its outer end is anchored by a stud which projects from the wrist-plate. A pin 5 extends from the said wrist-plate upon the same approximate plane as the disk B and adjacent its circumferential edge, the pin being provided with a jacket of rubber or other suitable fibrous material constituting a brake-shoe, adapted to be forced against the edge of said disk.

The peripheral edge of the wrist-plate is provided with a notch 6, which notch is designed to be engaged by one end of bolt 7 being slidably mounted in ear extensions of the base-plate. The opposite end of the bolt carries a pin 9 that is fitted within the slotted end of a lever 10, the latter being pivotally hung upon a standard 11, which rises from the base-plate. A coil-spring 12 is connected to the lower arm of the lever 10 and a fixed stud 13 carried by the base-plate, by means of which spring-connection the bolt 7 is held against the peripheral edge of the wrist-plate. A slotted tappet-finger 14 is secured to the end of the upper arm of lever 10, by means of a thumb-screw 15, which screw passes through the slot in the tappet-finger and an aperture in said lever, whereby said tappet-finger may be adjusted relative to the movement of the swinging-arm with which it has engagement when the latter has moved to a position where a record upon the disk is approximately concluded.

When it is desired to eliminate the automatic stop-mechanism, in case of a repeater-mechanism being used in connection with the instrument, it can be readily effected by a spring-controlled dog 16, which dog, as shown, is arranged to engage a notch 17 in the wrist-plate, the engagement being accomplished by means of a handle 18 carried by said wrist-plate for convenience in revolving the latter until the notch 17 and nose of the dog have registered. It will be observed that when this shift of the wrist-plate by hand takes place, the brake-shoe is carried away from the record-disk and is locked. The handle 18 is also utilized to reset the wrist-plate after each automatic stop, the set being effected by turning said wrist plate so as to move the brake-shoe from its engaged position with the adjacent edge of the disk, and with this movement it will be seen that this bolt 7 will lock in its notch 6, and the disk being free to revolve, the instrument will start.

From the foregoing it is apparent, that should the parts be in the position shown in Fig. 1, the record disk will revolve and move the swinging arm towards the tappet-finger. Now when the arm has approximately completed its movement, it will strike the tappet-finger, which movement in turn causes the bolt to withdraw from its notch in the wrist-plate and thus permit coil spring 4 to

force the brake-shoe against the edge of the record disk, whereby the same is instantly stopped. Stoppage of the disk is not dependent upon the tension of the spring 4, which tension may be only sufficient to throw the rubber jacketed pin 5 into frictional engagement with said disk. This is due to the fact that the disk and wrist-plate 2 are revolved in the same direction, the rotation of said disk tending to crowd the pin toward a radial line intersecting the axis of the aforesaid disk and wrist-plate. The engaging action consequently has the effect of cramping this pin, a yield of its rubber jacket being the result, whereby a positive lock is obtained independent of the initial spring-controlled movement of the wrist-plate. By utilizing the spring-pressure as a motive power to only throw the pin into engagement with the disk, it will be seen that the force required to trip said spring will be materially lessened, whereby no detrimental effect is had upon the motion of the horn, which motion is acquired through its needle engaging the minute spiral threads of the disk. The swing-arm can after being stopped then be moved over to the starting-position, and the automatic stop-mechanism being reset, the instrument is again ready to be put in motion. By employing an automatic mechanism, as shown and described, it will be understood that damage to the record-disk and machine is avoided.

I claim:

1. In a disk phonograph having a swinging-arm, a spring-controlled rotatory wrist-plate disposed adjacent to the edge of the phonograph-disk and adapted to have rotation in the same direction as the latter, a brake-shoe carried by the wrist-plate for engagement with the edge of said phonograph-disk, means for locking the wrist-plate, whereby the brake-shoe is held from engagement with said disk, and a tappet in connection with the disk-locking means in the path of travel of the swinging-arm, whereby release of said locking means is effected when said swinging-arm engages the tappet.

2. In a disk phonograph having a swinging-arm; an attachment comprising a rotatory spring-controlled notched wrist-plate disposed adjacent to the edge of the phonograph disk and adapted to have rotation in the same direction as the latter, a brake-shoe carried by the wrist-plate for engagement with the edge of said phonograph disk, a spring-controlled bolt for engagement with the notch in said wrist-plate, a lever in connection with the bolt, and a tappet carried by

the lever, the tappet being arranged in the path of travel of the swinging-arm.

3. In a disk phonograph having a swinging-arm; an attachment comprising a rotatory spring-controlled notched wrist-plate disposed adjacent to the edge of the phonograph disk and adapted to have rotation in the same direction as the latter, a brake-shoe carried by the wrist-plate for engagement with the edge of said phonograph disk, a spring-controlled bolt for engagement with the notch in said wrist-plate, a lever in connection with the bolt, a tappet carried by the lever, the tappet being arranged in the path of travel of the swinging-arm, and normally controlled locking means in connection with the aforesaid wrist-plate, whereby the wrist-plate brake-shoe is held against operation.

4. In a disk phonograph having a swinging-arm; an attachment comprising a base-plate secured to the phonograph box, a rotatory spring-controlled notched wrist-plate mounted upon the base-plate, the wrist-plate being disposed adjacent to the edge of the phonograph disk and adapted to have rotation in the same direction as said phonograph disk, a normally releasable locking-dog for engagement with one of the wrist-plate notches, a vertically disposed brake-shoe carried by said wrist-plate for engagement with said phonograph disk, a slidable spring-controlled bolt carried by said base-plate for engagement with a notch of the aforesaid wrist-plate, a controlling lever for the bolt in pivotal-connection with the aforesaid base-plate, and an adjustable tappet carried by the lever disposed in the path of travel of the swinging-arm.

5. In a disk phonograph having a swinging-arm; an attachment comprising a pivoted wrist-plate located adjacent to the edge of the phonograph disk, a brake-shoe in connection with the wrist-plate for engagement with the phonograph disk edge, an actuating spring for said wrist-plate adapted to exert power thereon in the same direction as that of the travel of the phonograph disk, a locking mechanism for the wrist-plate, and releasing means in connection therewith disposed in the path of travel of the swinging-arm of the phonograph.

In testimony that I claim the foregoing I have hereunto set my hand at Athens, in the county of Marathon and State of Wisconsin in the presence of two witnesses.

CLAUDE F. HAMILTON.

Witnesses:

FRANK F. CHESAK,
J. C. NUERNBERG.

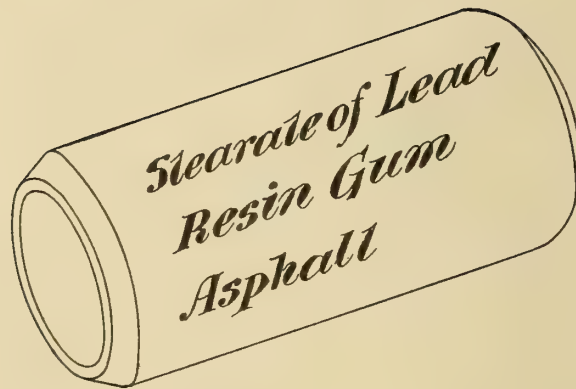
J. W. AYLSWORTH.

PHONOGRAPH RECORD COMPOSITION.

APPLICATION FILED NOV. 7, 1906. RENEWED OCT. 12, 1908.

920,245.

Patented May 4, 1909.



Witnesses:

Frank D. Lewis
Anna P. Kehm

Inventor:

Jonas W. Aylsworth

by Frank T. Lee
Atty.

UNITED STATES PATENT OFFICE.

JONAS W. AYLSWORTH, OF EAST ORANGE, NEW JERSEY, ASSIGNOR TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

PHONOGRAPH-RECORD COMPOSITION.

No. 920,245.

Specification of Letters Patent.

Patented May 4, 1909.

Application filed November 7, 1906, Serial No. 342,317. Renewed October 12, 1908. Serial No. 457,343.

To all whom it may concern:

Be it known that I, JONAS W. AYLSWORTH, a citizen of the United States, residing at 223 Midland avenue, East Orange, county of Essex, and State of New Jersey, have invented certain new and useful Improvements in Phonograph-Record Composition, of which the following is a description.

My invention relates to an improved composition for duplicate phonograph records, and my object is to provide a composition for the purpose, which is cheap, extremely durable, smooth, tough, and of very superior wearing qualities.

Although my improved composition is much cheaper than compositions now used in the art, it is equally as smooth, so that the reproduction is as free from scratching and foreign noises, while at the same time the material is so very hard and tough that the reproducers may be provided with heavier weights, stiffer diaphragms, and with greater leverage between the styluses and diaphragms than is now possible, so as to secure louder and better reproduction; or, on the other hand, the records may be formed with grooves of finer pitch, necessitating a smaller reproducing stylus, so as to increase the length of the reproduction. My composition, in fact, is so hard and durable that a record made therefrom having a pitch of 200 threads per inch, and engaged by a reproducing stylus of about one-fourth the diameter now used, will be substantially as durable as compositions at present in use with phonographs having 100 threads per inch. In my improved composition, I make use of a relatively large percentage of asphalt, which is a very cheap and hard material. I am aware that asphalt has been previously suggested as an ingredient in these compositions, but owing to its very slight coefficient of expansion and its sticky nature while hot, it has never been satisfactorily used. I find that a very superior composition can be made by combining asphalt with stearate of lead, and preferably a resin gum, such as copal, kauri, or colophony. A resin gum is desirable in the composition, as it tends to correct any crystallization which might exist in the stearate of lead, and also adds to the tough and durable qualities of the composition. If the attempt is made to produce a

composition in which asphalt is mixed with stearate of soda, which latter is a very common ingredient in the art, a homogeneous compound can not be produced, but a mixture of asphalt and stearate of lead is entirely homogeneous and possesses the desirable qualities indicated.

My improved composition is designed especially for use in the manufacture of duplicate sound records by a process in which the material is distributed over the bore of a rapidly rotating mold by centrifugal force, as I disclose in application for Letters Patent of the United States, filed May 11, 1906, Serial No. 316,250.

As an example of a convenient process for manufacturing my improved composition, the following operations may be performed: 400 lbs. of commercial stearic acid, preferably having no more than 5% oleic acid, and free from uncombined fats and glycerin, is added to 200 lbs. of resin gum (such as copal, kauri or colophony) and melted at a temperature from 250 to 400 degrees F. When the stearic acid and the gum are thoroughly melted I then add 100 lbs. of litharge or oxid of lead, which results in the formation of stearate of lead with possible traces of free stearic acid, and possibly some resin acid salts of lead. The reaction results in the generation of water, which is driven off as steam. After the formation of the stearate of lead, I now add a suitable proportion of a hard asphalt, such as gilsonite, Egyptian or Syrian asphalt, the amount depending on the qualities desired in the ultimate product. With the amount of stearic acid indicated, from 100 to 400 lbs. of asphalt may be introduced. I do not consider it desirable to add more than 400 lbs. of asphalt, because in that case, the material is likely to become too viscid, and can be molded only with great difficulty unless very high temperatures are used, and which are apt to injure the molds. After the introduction of the asphalt, a temperature of about 400 degrees F. is maintained until all products of decomposition have been driven off, and the material has become entirely liquid and quiescent. The composition is now carefully filtered, preferably through several layers of muslin and is then ready for use, or if desired, the stearic acid and asphalt may be

mixed and filtered before the litharge is added, practically all the impurities being in the two first mentioned ingredients.

In order that the invention may be better understood, attention is directed to the accompanying drawing, in which I illustrate a duplicate phonograph record, composed of my preferred composition.

While I have referred to the use of stearic acid throughout the above description, it will of course be evident that its common and well known equivalent, palmitic acid, may be substituted therefor without changing the characteristics of the composition, or its mode of manufacture. As a matter of fact, ordinary commercial stearic acid, of sufficient purity for my purpose, contains generally about fifty per cent. of palmitic acid.

Having now described my invention, what I claim as new and desire to secure by Letters Patent, is as follows:

1. An improved composition for sound records, comprising a mixture of asphalt, and a metallic stearate, substantially as and for the purposes set forth.

2. An improved composition for sound records, comprising a mixture of asphalt and stearate of lead, substantially as set forth.

3. An improved composition for sound records, comprising a mixture of asphalt, a metallic stearate and a resin gum, substantially as set forth.

4. An improved composition for sound records, comprising a mixture of asphalt, stearate of lead, and a resin gum, substantially as set forth.

5. An improved composition for sound records, comprising a mixture of asphalt, a metallic stearate and copal gum, substantially as set forth.

6. An improved composition for sound records, comprising a mixture of asphalt, stearate of lead, and copal gum, substantially as set forth.

This specification signed and witnessed this 3rd day of November 1906.

JONAS W. AYLSWORTH.

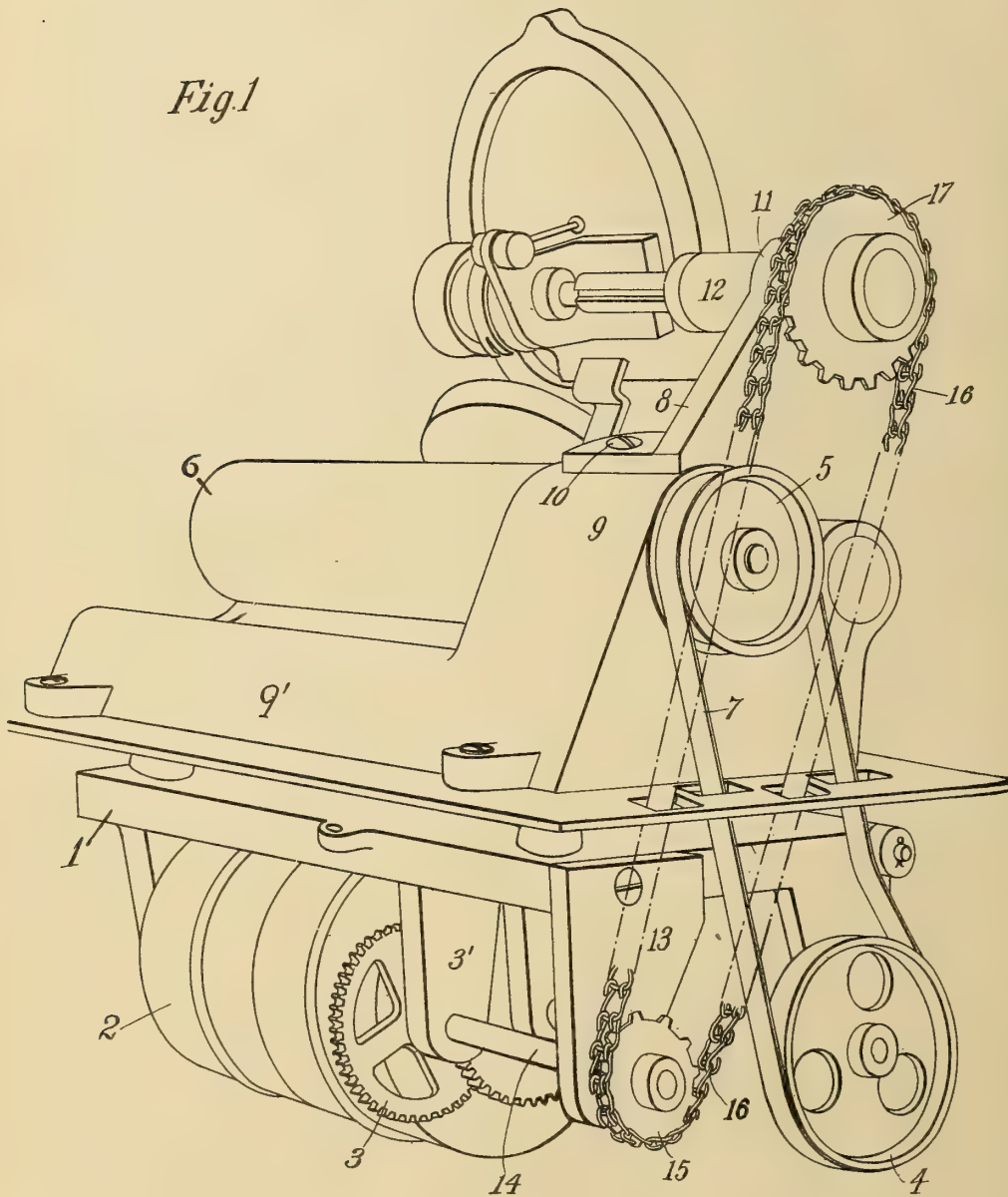
Witnesses:

FRANK L. DYER,
ANNA R. KLEHM.

920,324.

Patented May 4, 1909.
2 SHEETS—SHEET 1.

Fig. 1



Witnesses
M. Thompson.
and C. Fitzhugh.

Inventor
John H. J. Haines
By his Attorneys
Mauro, Cameron, Lewis & Moser

J. H. J. HAINES.

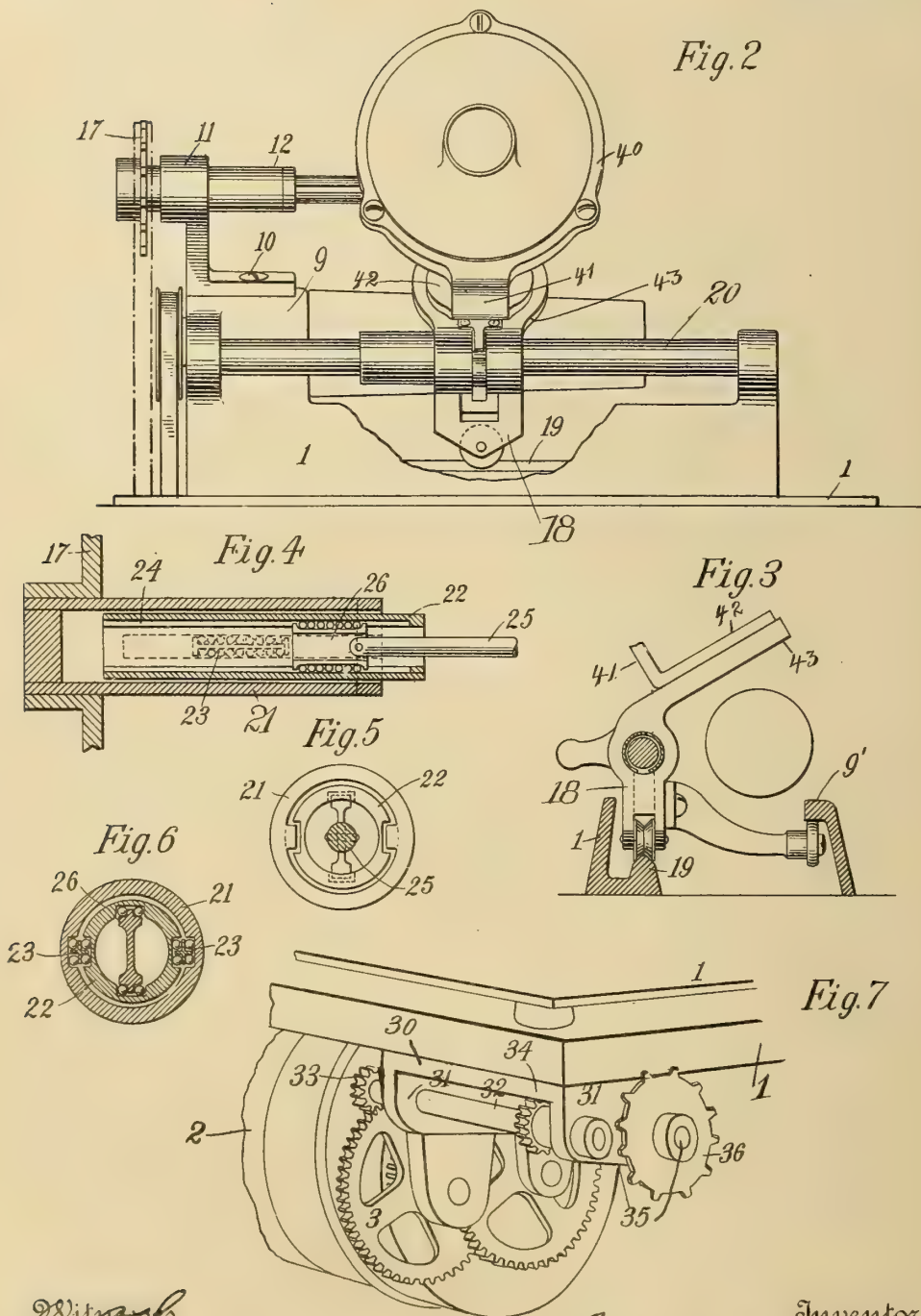
GRAPHOPHONE.

APPLICATION FILED APR. 16, 1908.

920,324.

Patented May 4, 1909.

2 SHEETS—SHEET 2.



Witnesses
Ruth C. Fitzhugh.

Inventor
John H. J. Haines.
 By his Attorneys
Mauro, Cameron, & Macie

UNITED STATES PATENT OFFICE.

JOHN H. J. HAINES, OF NEW YORK, N. Y., ASSIGNOR TO AMERICAN GRAPHOPHONE COMPANY,
OF BRIDGEPORT, CONNECTICUT, A CORPORATION OF WEST VIRGINIA.

GRAPHOPHONE.

No. 920,324.

Specification of Letters Patent.

Patented May 4, 1909.

Application filed April 16, 1906. Serial No. 312,014.

To all whom it may concern:

Be it known that I, JOHN H. J. HAINES, a citizen of the United States of America, and a resident of New York city, New York, have invented a new and useful Improvement in Graphophones, which improvement is fully set forth in the following specification.

This invention relates to graphophones or other talking machines employing a relay device for increasing the volume of sound reproduced, such as set forth in the Higham patents (Nos. 678,566; 712,930; etc.) and Macdonald patents (No. 796,743, etc.).

One part of the invention is based upon my observation or discovery that, whereas heretofore the friction-pulley or drum constituting a part of said relay device has been driven at a comparatively high rate of speed (about sixty revolutions per minute), the same benefits may be obtained if the said friction device be driven at a comparatively low rate of speed (say about fifteen revolutions per minute). I make use of this discovery or observation by taking power for revolving the friction-pulley from nearer the motor than heretofore, by reason of which I am enabled to apply the relay device to talking-machines having motors of less power than heretofore believed capable of running the machine itself and also the relay device.

The invention consists further of certain features of construction which permit the relay device being applied to a machine not originally constructed for that purpose.

The invention consists also of certain details to be pointed out and claimed.

The invention will be best understood by reference to the accompanying drawings in which—

Figure 1 is a perspective view of the rear of a graphophone, with the casing or box therefor removed, showing the relay device proper in outline only; Fig. 2 is a front view of the same graphophone; Figs. 3-6 are sectional views of details; and Fig. 7 is a modification of Fig. 1.

In the drawings, 1 represents the bed-

plate of an ordinary graphophone or other talking-machine.

2 is the casing containing the (spring) motor.

3 is a gear wheel being "the first intermediate gear" of the gearing as now commonly employed in talking-machines of this class.

4 represents a pulley driven from the motor, by the intermediate gearing (most of which is not shown), in the usual manner.

5 is a pulley fast on the mandrel 6, and driven from pulley 4 by the belt 7.

All the foregoing parts are as usually employed in graphophones.

8 represents a bracket adapted to be secured upon the upper portion 9 of the casing of the graphophone, as by a bolt 10. At the upper end of this bracket is a bearing 11 in which is mounted the shaft 12 of the relay device.

On the underside of the bed-plate 1, I provide a lug 13, having a bearing that registers with the bearing in the lug 3; and, instead of mounting the gear 3 on the stud-bearing as heretofore, I provide therefor a shaft 14 which is journaled in lugs 3' and 13.

15 is a sprocket-wheel fast to the outer end of shaft 14, and 16 is a sprocket-chain passing around wheel 15 and the sprocket-wheel 17, which latter is fast on the shaft 12 of the relay-device.

The frame 18 of the speaker has a neck or bracket 41 extending from the edge thereof at practically right angles, and from this neck extends a ring 42 substantially parallel with the speaker 18. Ring 42 fits into the ring 43 that forms a part of the carriage, being inserted and held therein, and detachable therefrom, in the manner well known in the ordinary Edison phonograph construction.

Referring to Figs. 2 and 5, 18 is a member depending from the ordinary carriage of the talking machine, said lug being provided with one or more rollers which run along the straight edge 19, that rises from the front of the bed-plate 1. A longer bracket arm or member depending from the carriage is

curved so as to extend below the mandrel and engage another straight edge at the rear of the covering of the machine (beneath the portion 9' of the casting 9, see Fig. 3). While I do not claim the use of rollers (as just explained) as novel with myself, what I believe to be novel is the so-adjusting of the parts that the rollers upon member 18 will bear practically all the weight of the carriage and its parts (including the relay-device), instead of having this weight borne as heretofore by the split-sleeve 20 that encircles the feed screw. The weight of the carrier being thus borne by the rollers, all friction is practically eliminated and function of the split-sleeve 20 is merely to guide and steady the carriage.

Fig. 4 shows not only the employment of anti-friction devices (rollers or ball-bearings) in the telescoping-journal heretofore employed for driving the relay-device, but also the lengthening of the "feathers" or splines. 21 represents the larger section of the journal, which is tubular and mounted in the bearing 11, and has the sprocket-wheel 17 fast upon its outer end. 22 is the intermediate section, also tubular, provided externally with two diametrically opposite longitudinal grooves in which engage the two extended splines 23 projecting inwardly from the bore of member 21. 24 represents two oppositely located internal longitudinal grooves in the bore of the member 22. 25 represents the third member of the telescoping shaft, having its diameter somewhat smaller than the bore of the member 22 in which it is seated, so as to permit member 25 to have a slight sidewise play. At the inner end of this member 25 is pivoted a somewhat extended key 26 provided with roller-bearings and adapted to engage in the internal grooves 24. This construction not only removes any friction of those parts, but likewise any tendency of the parts to jam or bind.

The modification shown in Fig. 7 is for the purpose of applying a relay device to a machine not originally built for one. 30 represents a plate having two lugs 31 in which is journaled a shaft 32 carrying a gear 33 that meshes with the first intermediate gear 3 of the machine, and having at its other end a gear 34 that meshes with a similar gear (not shown) mounted on a stub axle 35. Fast on the other end of this stub axle is a sprocket wheel 36, which carries a sprocket chain as in Fig. 1. (The object of the additional gearing 34, is to give the proper direction to the revolution of wheel 36). The other parts of the apparatus are as shown in Fig. 1. The plate 30 will be secured to the bed-plate of the talking-machine, as by tapping a screw-

threaded hole into the bed-plate and screwing the two together; in like manner a screw-threaded hole will be tapped into the portion 65 9 of the casting, and the bracket 8 screwed thereto; the relay device proper may be screwed, soldered or otherwise fastened to the carriage of the machine; and, finally, the sprocket-chain is slipped over the 70 sprocket-wheels 36 and 17.

I have described my invention with some particularity, yet for the sake of clearness only, without intending thereby to limit myself to the precise constructions shown, 75 since the same may be modified without departing from the spirit of my invention; for instance I may dispense with sprocket-wheels and chain and employ a shaft with mitered gears. It will also be understood that parts 80 of my invention may be used to the exclusion of other parts.

Having thus described my invention, I claim:

1. The combination with a talking-machine, of a detachable relay-device comprising three parts, namely, a detachable bracket carrying the reproducer and the relatively stationary part of the relay-device proper, another detachable bracket carrying the 90 relatively movable part of said relay-device, and a third detachable bracket carrying means for rotating said movable part.
2. The combination with a talking-machine, of a bracket carrying gears and a 95 sprocket-wheel and adapted to be secured to said talking-machine, another bracket carrying the movable member of a relay-device including a sprocket-wheel adjacent to the first named sprocket-wheel and 100 adapted to be secured to the talking-machine, and the relay-device proper adapted to be secured to the carriage of the talking-machine and actuated through said sprocket-wheels. 105
3. The combination with a talking-machine, of a relay-device therefor comprising a reproducer and the relatively stationary part of the relay-device proper, a detachable bracket carrying the relatively movable 110 part of said relay-device secured to the frame of the talking-machine, and a detachable bracket carrying means for rotating said movable part.
4. The combination with a talking-machine, of a relay-device therefor comprising a detachable bracket carrying the reproducer and the relatively stationary part of the relay-device proper, the relatively movable part of said relay-device and suitable 115 supports therefor secured to the frame of the talking-machine, and a detachable bracket carrying means for rotating said movable part. 120

5 5. The combination with a talking-machine, of a relay-device therefor comprising a detachable bracket carrying the reproducer and the relatively stationary part of the relay-device proper, another detachable bracket carrying the relatively movable part of said relay-device, and suitable means for rotating said movable part.

10 6. The combination with a talking-machine, of a relay-device comprising the reproducer and the relatively stationary part of the relay-device proper, a detachable

bracket carrying the relatively movable part of said relay-device secured to the frame of the talking-machine, and means for rotating said movable part.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

JOHN H. J. HAINES.

Witnesses:

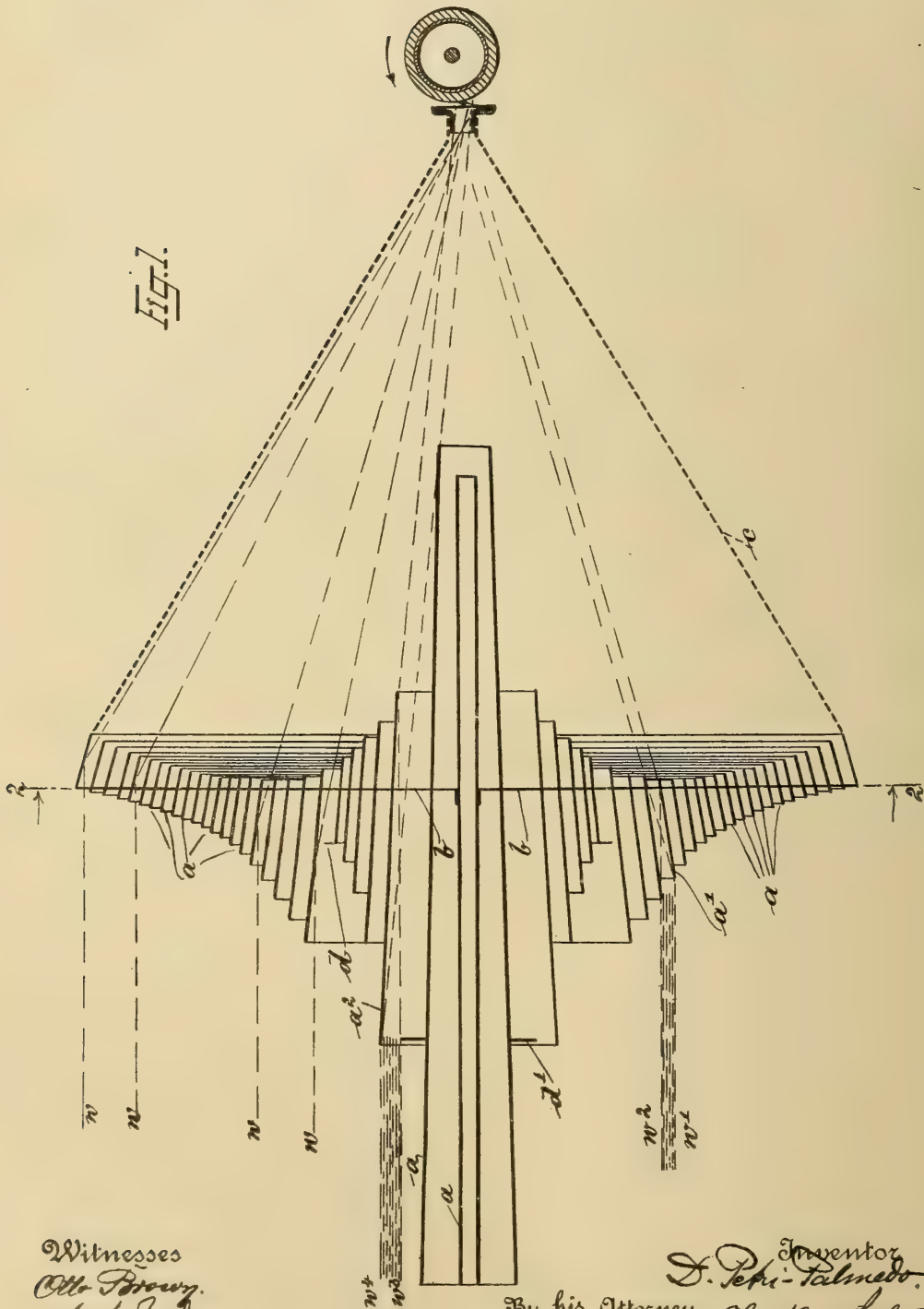
C. A. L. MASSIE,

JOHN J. PHEELAN.

D. PETRI-PALMEDO.
ACOUSTIC LENS.
APPLICATION FILED AUG. 11, 1908.

920,387.

Patented May 4, 1909.
2 SHEETS—SHEET 1.



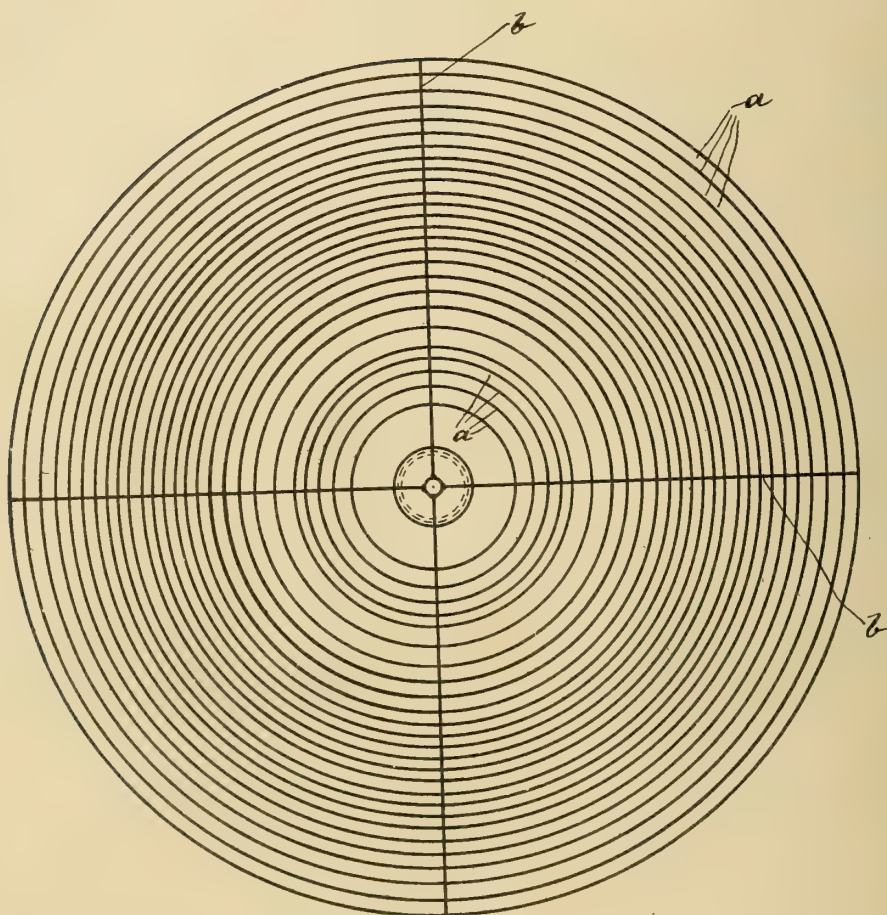
Witnesses
Otto Brown.
A. K. Jesberger.

Inventor
D. Petri-Palmedo.
By his Attorney L. H. Schmitt.

920,387.

Patented May 4, 1909.
2 SHEETS—SHEET 2.

Fig. 2.



Witnesses:
Otto Browny.
A. H. Jesberger.

Inventor
D. Petri-Palmedo.
By his Attorney *L. M. Schmitt.*

UNITED STATES PATENT OFFICE.

DAVID PETRI-PALMEDO, OF HOBOKEN, NEW JERSEY.

ACOUSTIC LENS.

No. 920,387.

Specification of Letters Patent.

Patented May 4, 1909.

Application filed August 11, 1908. Serial No. 447,922.

To all whom it may concern:

Be it known that I, DAVID PETRI-PALMEDO, a citizen of the United States of America, and a resident of Hoboken, in the county of Hudson and State of New Jersey, have invented certain new and useful Improvements in Acoustic Lenses, of which the following is a specification.

This invention relates to the art of transmitting and recording sound as embodied in various contrivances now in general use such as telephones, phonographs, graphophones and the like. In all these apparatus the sound waves originated by the human voice, musical instruments or other sources are made to impinge upon an elastic diaphragm or membrane which is set into vibrations thereby. The vibrations of the diaphragm are then used either to make impressions on a soft cylinder or plate by means of a stylus as in the various sound recording apparatus in use, or to cause secondary currents to be induced in an electric circuit for the transmission of sound as in the telephone. In order that the vibrations of such a membrane be sufficiently violent to be used for recording with a stylus or to generate sufficiently strong secondary currents in a telephone, the source of sound must be very close to the membrane. This is at best an inconvenience in telephone apparatus, and a positive hindrance in phonographic work such as for instance the recording of orchestral and vocal music, and even speech.

In making phonograph records it has been the general practice to use simple funnel shaped horns of various diameters and lengths presumably for the purpose of condensing the sound waves emanating from the source. Funnels of relatively great length and small diameter are thus used for concentrated sources such as the voice of an individual speaker or singer or an individual instrument; and funnels of relatively small length and large diameter for dispersed sources of sound such as the instruments of an orchestral band, the combined voices of a quartet, or chorus of singers, and the like. The presumption that by such funnel shaped horns sound waves can be condensed and made to produce true records is erroneous. I have, in carrying out the work of making records for teaching foreign languages with the aid of the phonograph demonstrated the fact that good clear records can be produced only by the speaker keeping his mouth close

to the diaphragm, with just a small mouth piece for an intermediate apparatus. The use of funnel shaped horns of any kind in any kind of phonographic and telephonic work produces reflection of the sound waves from the walls of the funnels in such a manner that the majority of the waves originally entering the funnel are finally lost vibrating at right angles to the walls and only those waves do actual work on the diaphragm that enter the funnel at or about the center and suffer no, or but slight reflection from the wall of the funnel, so that as good or bad results may be accomplished with horns of small diameter, and the use of large funnels is useless, and more than that, injurious to the production of true records, because those sound waves that are strongly reflected and finally vibrate back and forth within the funnel, not only fail to do useful work but set up so called "standing waves", and create vibrations of the horn itself resulting in extraneous sounds known in the technical language of the art as "barrel tones", "metallic sounds", and the like.

It is the purpose of this invention to do away with the erroneous method of using funnel shaped horns. To this end I collect the sound waves and condense them in a manner analogous to the collection and concentration of light waves by means of glass lenses. I do not, however, make use of the property of refraction, this presenting practical difficulties, but that of reflection only. For this purpose I have constructed an acoustic lens consisting of a screen composed of a series of concentric truncated cones of varying angularity, and by means of these I divide up the total quantity of sound waves coming from the source toward the diaphragm into a series of sound wave cones that, after having suffered but one reflection in passing through the screen of concentric truncated cones are directed toward the diaphragm, all as will be fully described hereinafter in connection with the accompanying drawings in which:

Figure 1 represents in central longitudinal section such an acoustic lens, embodying in desirable form the present improvement, and Fig. 2 is a vertical cross section of the same on line 2, 2 Fig. 1.

In the drawing *a* are concentric truncated conical members or rings of various angularity held in place relatively to each other by cross wires *b* of which two or more may

be used. The whole screen thus composed of the rings a may be held in position at a certain distance from the diaphragm by an outside shell or horn c as shown in dotted lines in Fig. 1, or it may be mounted in some convenient manner on a stand or other fixture enabling it to be placed at a proper distance from the diaphragm. The construction of this acoustic lens or screen is as follows: assuming for the sake of simplicity that the source is so far away from the recording diaphragm that the sound waves traveling toward it may be practically regarded as parallel, as indicated by the thin dotted line w in Fig. 1. If such waves w impinge upon the screen they will be reflected, as shown in Fig. 1, toward the diaphragm, the angularity of the concentric rings being of the proper magnitude, and become smaller and smaller as the rings become smaller in diameter, that is, located more closely to the center of the screen. At the very center of the screen the last concentric ring assumes the shape of a cylindrical tube of a diameter equal to the opening of the diaphragm holder. The lengths of the concentric rings or truncated cones and the distances between them is such that the area covered by the sound waves deflected by one individual ring will not exceed in width the diameter of the opening in the diaphragm holder, as clearly shown for example by the area of sound waves w^1, w^2 , impinging on the ring a^1 or the area w^3, w^4 , impinging on the ring a^2 . To carry this system to its logical conclusion and to avoid waves entering the space behind the screen without being properly reflected and thus to cause interferences, it even becomes necessary to insert now and then baffle plates, as shown for instance at d and d^1 in Fig. 1.

The acoustic lens for condensing sound as above described may be applied for various purposes but has been devised for instance for the manufacture of records and it has been the endeavor to produce records from which, upon the reproduction of the sound emanates same in a full, clear, melodious and harmonious tune without any foreign, disagreeable or shrieking sounds.

I claim as my invention:

1. An acoustic lens comprising a series of concentric truncated conical members of various length spaced from one another, each member being successively tapered to a less extent than its outer member.

2. An acoustic lens, comprising a series of concentric truncated conical members spaced from one another and of various length so that their edges lie in a curved surface on each side, each member being successively tapered to a less extent than its outer member.

3. An acoustic lens, comprising a series of concentric truncated conical members spaced from one another and of various length so that their edges lie in a curved surface on each side, and means for holding the conical members in their relative positions, each member being successively tapered to a less extent than its outer member.

4. An acoustic lens, comprising a series of concentric truncated conical members spaced from one another and of various length so that their edges lie in a curved surface on each side, and means for holding the conical members in their relative positions, and an outside tapering horn or shell, each member being successively tapered to a less extent than its outer member.

5. An acoustic lens, comprising a series of concentric truncated conical members spaced from one another and of various length so that their edges lie in a curved surface on each side, and means for holding the conical members in their relative positions, each member being successively tapered to a less extent than its outer member, and a cylindrical member constituting the innermost member of said lens.

6. An acoustic lens, comprising a series of concentric truncated conical members of various length spaced from one another, each member being successively tapered to a less extent than its outer member and a cylindrical member constituting the innermost member of said lens, and baffle plates between the conical members.

7. An acoustic lens, comprising a series of concentric truncated conical members of various length spaced from one another, each member being successively tapered to a less extent than its outer member and a cylindrical member constituting the innermost member of said lens, in combination with a diaphragm.

Signed at New York, N. Y., this 10th day of August, 1908.

DAVID PETRI-PALMEDO.

Witnesses:

LUDWIG K. BÖHM,
JACOB L. DIAMOND.



I. KITSEE.
PHONOGRAPHY.
APPLICATION FILED DEC. 31, 1908.

920,752.

Patented May 4, 1909.

Fig. 1.

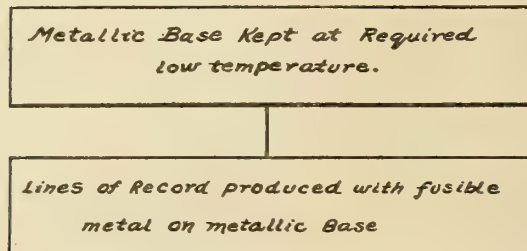
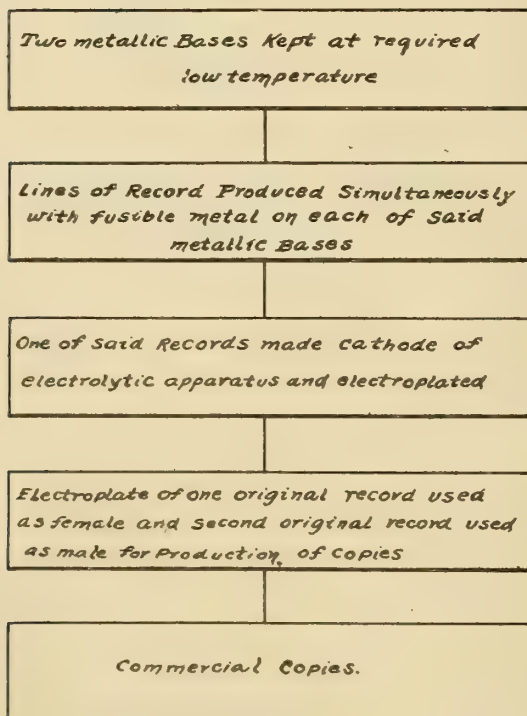


Fig. 2.



WITNESSES:

Edith R. Stilling
Mary C. Smith

INVENTOR

I. Kitsee

UNITED STATES PATENT OFFICE.

ISIDOR KITSEE, OF PHILADELPHIA, PENNSYLVANIA.

PHONOGRAPHY.

No. 920,752.

Specification of Letters Patent.

Patented May 4, 1909.

Application filed December 31, 1908. Serial No. 470,187.

To all whom it may concern:

Be it known that I, ISIDOR KITSEE, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Phonography, of which the following is a specification.

My invention relates to an improvement in phonography.

One of its objects is to produce original records wherein the lines of record are in relief and may be used for the production of copies without necessitating electroplating or etching.

It is also the object of my invention to produce simultaneously two records with the lines in relief and then using one of the records as a male and an electroplate of the other record as a female for the production of copies by using these records as dies.

I have discovered that if a metal of the necessary low fusing point is deposited or projected in accordance with the vibrating diaphragm on a suitable base, cooled or chilled to the necessary low temperature, the lines of record produced by the hardened metal are high enough for the purpose of producing copies therefrom with the aid of a plastic material.

In carrying out my invention, the first requisite is the selection of a suitable metal of low fusing point. It is advantageous that the fusing point of the metal with which the lines of record are produced should be as low as is compatible with the use of the record itself. The following combination I have used with perfect success:—To produce one pound of metal, I use $1\frac{1}{2}$ ounces of cadmium; $4\frac{1}{2}$ ounces of lead; 2 ounces of tin; 7 ounces of bismuth and 1 ounce of mercury. But it is obvious that different combinations may be used to suit different requirements.

The second consideration in practicing my invention is, to keep the metal always at the necessary high temperature. This temperature may be produced by a burning jet of alcohol gas, or other inflammable material, or it may be produced with the aid of the electric current and this latter means I prefer. When the reservoir in which the molten metal is contained is made out of iron, the necessary high temperature can easily be reached by sending alternating currents through the coil surrounding the

iron. The method of producing heat with the aid of resistance coils is so well understood by persons versed in the art that it is unnecessary for me to go into detail of same. It suffices to say that the regulation of the heat with the aid of a rheostat is easily accomplished.

The plate on which the lines of record are produced is preferably made of a metal of high fusing point, such for instance as copper or iron.

The third consideration in practicing my invention is that the base on which the fusible metal is to be projected should always be maintained at the necessary low temperature, so that the fused metal should, on striking the base, instantaneously coagulate and become solid. This low temperature may be produced either through a cold air blast, through a foundation of ice, or through such artificial means as liquefied air. But I have found that it is only necessary to subject the lower part of the base to a continuous spray of cold water.

In practicing my invention, it is also necessary that the metallic base should be scrupulously clean and all oxidation on said base should be prevented.

I have found that a very slight film of rosin greatly facilitates the combining of the deposited metal with the base.

When the original record is produced, the same may be used without further processes as the negative to produce in the usual manner commercial copies with the aid of a plastic material. But in such cases where a great number of copies have to be used and where one negative is not sufficient, I produce simultaneously two original records with the metallic lines of record in relief. I subject then one of these records to the process of electroplating, using then this electroplate as the female and the other original record as the male for compressing suitable material between them, so as to produce necessary copies. These, in broad outlines, are the features of my invention.

In the accompanying drawing, Figures 1 and 2 illustrate the steps in diagram of the herein described method.

Having now described my invention, what I claim as new and desire to secure by Letters Patent is:—

1. The method of producing a sound record, which consists in forming upon a suitable base a raised line of metal while in a

molten state and corresponding to sound vibrations, and maintaining said base at a sufficiently low temperature to harden the metal deposited thereon.

- 5 2. The method of producing a sound record, which consists in depositing upon a suitable base a line of metal in a molten state, effecting said deposit in accordance with the vibrations of a phonographic diaphragm,
10 and maintaining said base at a sufficiently low temperature to harden the metal deposited thereon.

3. The method of producing a sound record, which consists in forming upon a suitable base a raised line of metal while in a
15 molten state and corresponding to sound vibrations, reducing the temperature of the base to a temperature lower than the temperature of the metal forming the line, whereby
20 said metal is caused to coagulate when brought into contact with the base.

4. The method of producing a sound record, which consists in forming upon a suit-

able base a raised line of metal while in a molten state and corresponding to sound vibrations, and chilling said base at the time of
25 contact of the molten metal, whereby the latter is caused to coagulate at the time of such contact.

5. The method of producing a sound record, which consists in projecting in consonance with sound vibrations a metal of low
30 fusing point and in a molten state upon a base having a high fusing point to form upon said base a raised line corresponding to
35 said sound vibrations, and chilling said base at the time of contact of the molten metal, whereby the latter is caused to coagulate at the time of such contact.

In testimony whereof I affix my signature
40 in presence of two witnesses.

ISIDOR KITSEE.

Witnesses:

EDITH R. STILLEY,
MARY C. SMITH.



O. G. ROSE.
SOUND REPRODUCING APPARATUS.
APPLICATION FILED APR. 24, 1908.

921,465.

Patented May 11, 1909.
2 SHEETS—SHEET 1.

Fig. 1.

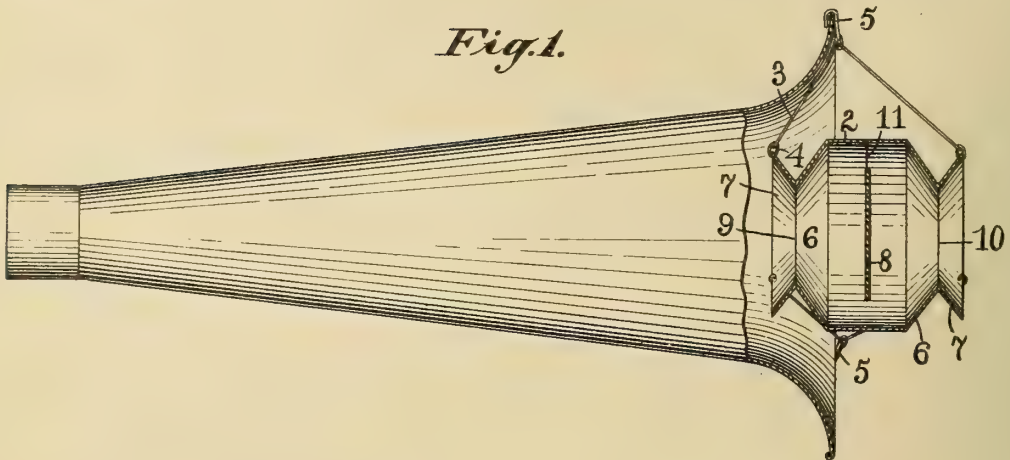


Fig. 2.

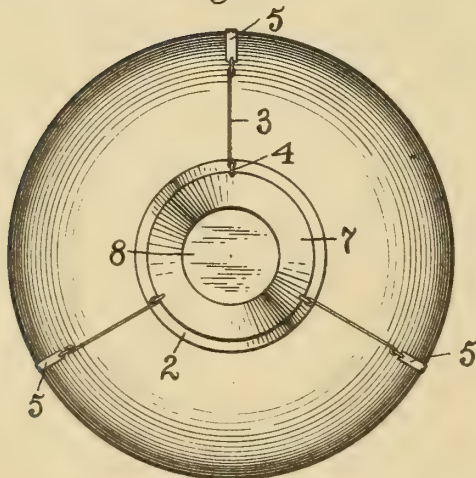


Fig. 3.

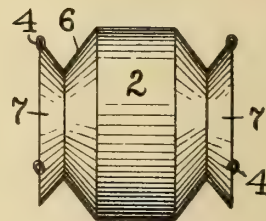
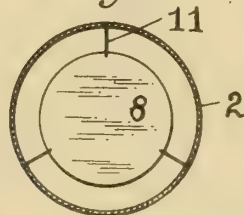


Fig. 4.



WITNESSES:

J. C. Thiedner
Edward N. Sarton

INVENTOR
Oscar G. Rose
BY *Spencer Lecky*
ATTORNEY

O. G. ROSE.
SOUND REPRODUCING APPARATUS.
APPLICATION FILED APR. 24, 1908.

921,465.

Patented May 11, 1909.
2 SHEETS—SHEET 2.

Fig. 5.

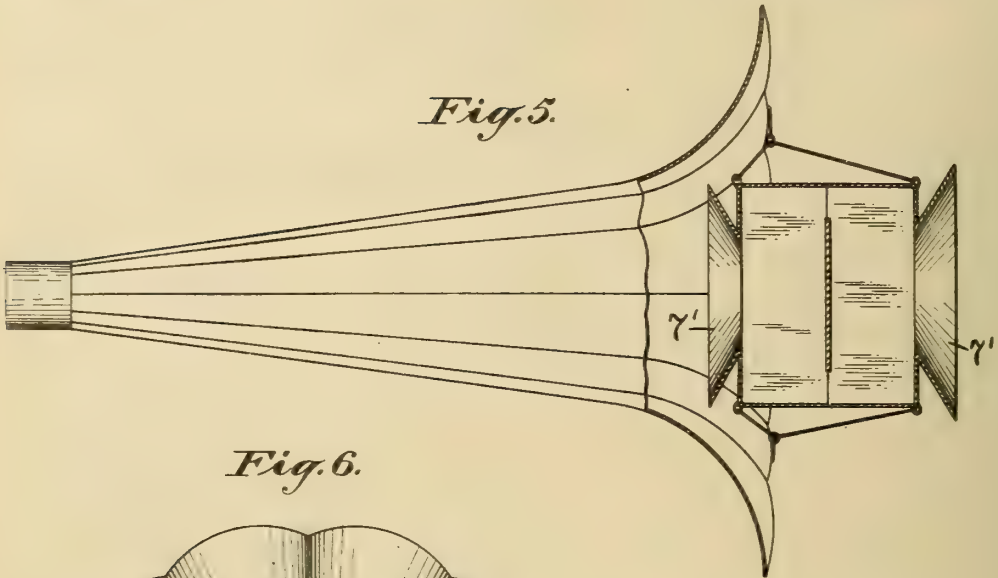


Fig. 6.

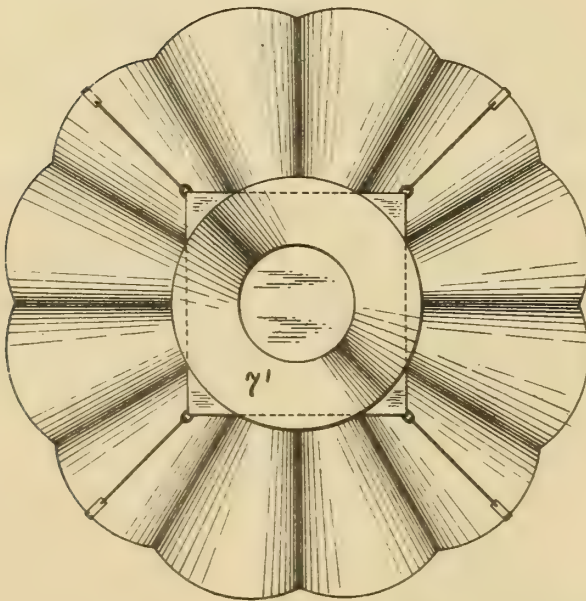


Fig. 7.

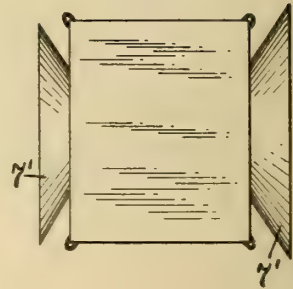
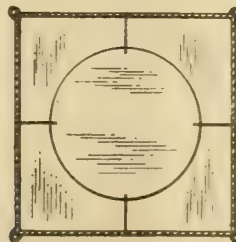


Fig. 8.



WITNESSES:

J. C. Fiedner
Edward N. Sartou

INVENTOR

Overeud G. Rose

BY

Spear & Seely
ATTORNEY

UNITED STATES PATENT OFFICE.

OVEREND G. ROSE, OF CAMP MEEKER, CALIFORNIA.

SOUND-REPRODUCING APPARATUS.

No. 921,465.

Specification of Letters Patent.

Patented May 11, 1909.

Application filed April 24, 1908. Serial No. 429,047.

To all whom it may concern:

Be it known that I, OVEREND G. ROSE, a citizen of the United States, residing at Camp Meeker, in the county of Sonora and State of California, have invented certain new and useful Improvements in Sound-Reproducing Apparatus, of which the following is a specification.

My invention is an improvement in sound reproducing instruments, and relates particularly to an attachment for focusing the sounds and for analyzing them so that, for instance in the case of a reproduction of band music, the volume of tones will be focused and analyzed, the resultant effect being the splitting up of the sound into the tones of the respective instruments and the placing of said tones or sounds in the same relative position or at the same relative distance apart that they occupied when they were played and the record originally produced, that is to say, the trombones will sound as located farthest back, the tubas and altos in front of them, the piccolos and snare drums still farther forward, while the sound of the clarinets proceeds from the focusing device or disk itself.

My invention performs an additional function to that of focusing and analyzing sounds in that the device augments considerably the strength of the sound and increases its volume.

The invention consists in the features and combination and arrangement of parts hereinafter described and particularly pointed out in the claims.

In the accompanying drawings—Figure 1 is a side view of a horn of a reproducing instrument with my invention associated therewith; Fig. 2 is an end view of the parts shown in Fig. 1 looking from the right of said figure; Fig. 3 is a detail side view of the sound box; Fig. 4 is a cross sectional view of the sound box; Fig. 5 is a view similar to Fig. 1 of a modified form of sound box; Fig. 6 is a view looking from the right of Fig. 5; Fig. 7 is a side view of the modified form of sound box shown in Fig. 5; and Fig. 8 is a cross sectional view of the box shown in Fig. 7.

In the drawings 1 indicates a horn of a reproducing instrument. Within the mouth of this horn is arranged my attachment for focusing, analyzing and augmenting the sounds passing from the horn. This device 2 is suspended in the mouth of the horn by

means of links or cords 3 of any suitable material engaging rings or eyelets 4 on the attachment and having clips 5 for convenient attachment with the flared mouth of the horn.

The form of sound box or attachment shown in Figs. 1 to 4 consists of a box-like device with hollow truncated-conical-ends 6 forming continuations of the cylindrical wall of the box and having at their outer ends inverted-truncated-conical portions 7 presenting outwardly flaring walls. At the points where the conical and inverted conical ends join there is presented at each end of the sound box an opening forming a circular air diaphragm through which the sound enters and leaves the sound chamber. Within the chamber or box a focusing and analyzing disk 8 is arranged, this being slightly larger in diameter than the diameter of the air diaphragms or openings at 9, 10, and this disk is held centrally in relation to the walls of the sound box or chamber by fine suspending wires 11. The diaphragm or disk is imperforate, and the suspending wires being taut the disk will be rendered sensitive to the action of the finest sound waves. The box, as well as the disk, can be formed of any material suitable for the purpose, such as metal, wood fiber, or fiber board, and it will be understood that I do not limit myself in this respect.

In the action of the device the sound from the reproducing instrument passes through the horn and enters the sound box. There it is focused at the disk and it is analyzed thereby, so that it will be split up into the tones of the various instruments and these tones, when delivered from the sound box, will be placed at the same relative distance apart that they occupied when originally produced in making the record. I have given above one illustration of what I mean by separating and placing the tones and may mention here an additional instance as in the case of the human voice with an instrumental accompaniment, such as a piano or orchestra. In this instance the voice will sound from the focusing disk while the accompaniment plays farther back in its proper relative position. Besides analyzing and focusing the sound the device also augments it considerably and so increases its volume that with an ordinary 22 inch flower horn the human voice will be given off in its natural volume, and the same is true with

solo instruments, such as violins, etc. In Fig. 1 I show the focusing and analyzing disk as suspended in the center of the sound chamber. While this is the approximate position in sound chambers of the smaller sizes, in the larger and longer ones I prefer to suspend the disk at a point about one fourth of the length of the sound chamber from the outer annular opening. In case a large volume of sound is not required, the sound box may be used with a small horn and the same volume will be secured as with a larger horn without the sound box. The device can be used with any desired shape of horn, such as a flower horn, trumpet, or the like. When the attachment is to be used in concert halls, theaters, etc., the front of the inverted truncated cone 7 can be extended so as to act as a reflector.

Referring to Figs. 5 to 8, the sound box, instead of being cylindrical, is shown of rectangular cross sectional shape. It has, however, circular openings at its ends and these ends, instead of being of truncated conical form, are flat or lie in planes extending at right angles to the axis of the attachment or the horn with which it is associated. I employ in this form, however, the outwardly flaring conical portions 7' similar to those described and shown in the first form. This construction also provides an open circular air diaphragm for the sound to enter and leave the sound box similar to the form first described. In this present form in which the sound box is of cubical shape an analyzing focusing disk is suspended by four hair like wires from the four sides of the cubical box

instead of three wires as in the form first described.

While I show the focusing and analyzing attachment in connection with a horn, I do not wish to limit myself in this respect.

I claim as my invention:—

1. In combination with a horn, an analyzing device consisting of a diaphragm and a hollow truncated cone said parts being suspended in the horn at or near its larger end, and adjacent each other, substantially as described.

2. In combination with a horn, an analyzing device consisting of a diaphragm suspended in the horn at or near its larger end and a body also suspended in said horn and adjacent the diaphragm said body having a hollow truncated portion and a flared portion, substantially as described.

3. In combination with a horn, an analyzing device consisting of a diaphragm suspended in the horn at or near its larger end and a body also suspended in said horn and adjacent the diaphragm, said body having a hollow truncated portion and a flared portion, said body being in the form of a box in which the diaphragm is suspended and hair-like supports between said box and the said diaphragm, substantially as described.

In testimony whereof I have affixed my signature, in presence of two witnesses, this 28th day of February 1908.

OVEREND G. ROSE.

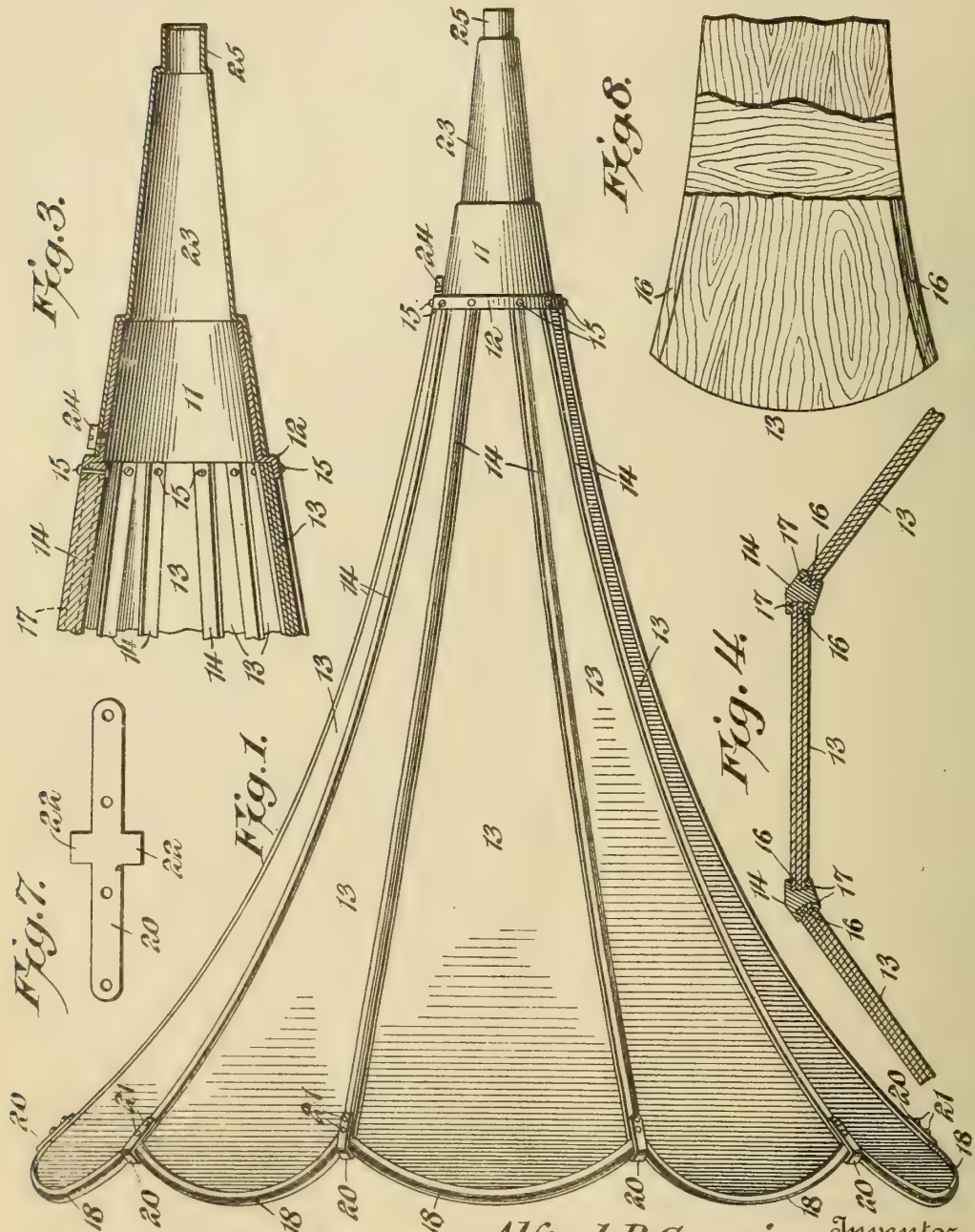
Witnesses:

FRANK L. OWEN,
F. M. BARTEL.



921,676.

Patented May 18, 1909.
 2 SHEETS—SHEET 1.



Witnesses
 Howard D. Ott.
 B. L. Foster.

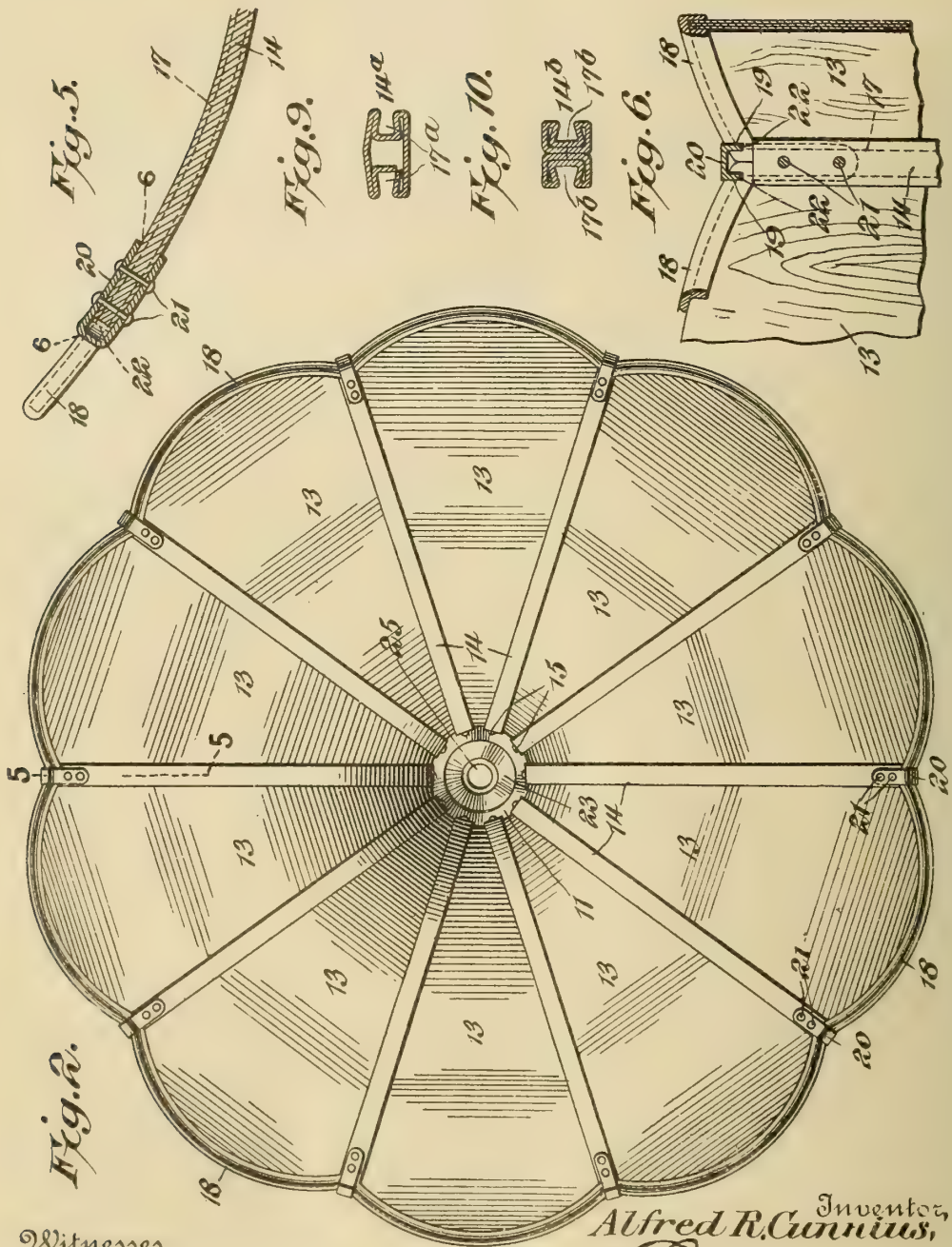
Alfred R. Cunnius, Inventor,
 By C. L. Siggers.
 Attorney



A. R. CUNNIUS.
SOUND AUGMENTING HORN.
APPLICATION FILED JAN. 6, 1908.

Patented May 18, 1909.
2 SHEETS—SHEET 2.

921,676.



Witnesses
Howard D. Orr.
Ch. J. J. J.

Inventor,
Alfred R. Cunnius,
By
C. J. J. J.
Attorney

UNITED STATES PATENT OFFICE.

ALFRED R. CUNNIUS, OF BROOKLYN, NEW YORK.

SOUND-AUGMENTING HORN.

No. 921,676.

Specification of Letters Patent.

Patented May 18, 1909.

Application filed January 6, 1908. Serial No. 409,567.

To all whom it may concern:

Be it known that I, ALFRED R. CUNNIUS, a citizen of the United States, residing at Brooklyn, in the county of Kings and State of New York, have invented a new and useful Sound-Augmenting Horn, of which the following is a specification.

The principal object of the present invention is to provide a horn, particularly useful in connection with phonographs, graphophones and similar sound reproducing instruments, which is comparatively simple in construction, and is composed of sections made of wood or other suitable material that will eliminate to a very material degree, harshness of tone, imparting clearness and fullness of tone that is so much desired.

A further object is to provide a horn that is very ornamental in appearance, and can be highly finished, the parts being comparatively simple, and the different sections being held securely in place.

The preferred embodiment of the invention is illustrated in the accompanying drawings, wherein:—

Figure 1 is a side elevation of the horn, showing the reducer in place thereon. Fig. 2 is a front elevation of said horn. Fig. 3 is a detail longitudinal sectional view through the smaller end thereof. Fig. 4 is a detail cross sectional view thereof. Fig. 5 is a detail longitudinal sectional view on the line 5-5 of Fig. 2. Fig. 6 is a sectional view on the line 6-6 of Fig. 5. Fig. 7 is a detail view of one of the clip blanks. Fig. 8 is a detail view of a portion of one of the horn sections, the parts being broken away to illustrate the arrangement of the veneer. Figs. 9 and 10 are cross sectional views illustrating modifications of the tie strips.

Similar reference numerals designate corresponding parts in all the figures of the drawings.

The smaller end of the horn comprises a metallic tapered cuff 11 provided at its larger end with an annular enlargement 12, forming an external annular shoulder. The body of the horn comprises a plurality of tapered sections 13, longitudinally curved and flat in cross section, said sections being preferably constructed of a plurality of layers of wood veneer glued together and having the grain crossed or disposed in angular relation, as illustrated in Fig. 8. The inner and smaller ends of the sections are located in the enlargement 12. Tie strips 14 are located be-

tween the adjacent edges of the various sections and have their inner ends located in the enlargement 12, and secured thereto by rivets or other suitable fasteners 15. The opposite longitudinal margins of the sections 13 are provided with continuous longitudinal dovetails 16 and the tie strips 14 have continuous dovetail grooves 17 in their opposite sides that are angularly disposed and receive said sections. It will be noted that the channels forming the dovetails are cut solely in the outside layers and do not extend completely through the same.

The outer end edges of the sections 13 are inclosed by metallic binding strips 18. These strips are abutted at their ends against one another and against the outer ends of the tie strips 14, as will be evident by reference to Fig. 6. They are furthermore provided adjacent to their ends and in their outer sides with sockets 19. The various abutting ends are secured together by substantially U-shaped clips 20 that embrace the ends as shown in Figs. 5 and 6, and are secured to the tie strips by rivets 21 or other suitable fasteners. These clips are provided at their outer ends with inwardly extending tongues 22 which tongues engage in the sockets 19. As a result, the clips interlock with the binding strips, preventing their separation and said clips engaging over the ends of the binding strips, serve to prevent their movement away from the tie strips and cover the joints between the parts.

For certain instruments of a well known type, the cuff 11 is slipped into the end of the reproducer tube, but for other types of machines, a reducing sleeve 23 is employed, the outer end of which is enlarged and snugly receives the cuff 11, being abutted against the external shoulder thereof and detachably fastened thereto by a screw 24, which screw may also be employed for securing the cuff 11 in place on the instrument, when the sleeve is not in use. This sleeve is provided at its inner end with a constricted tubular nipple 25 on which the end of the sound-conveyer tube may be placed, as will be evident, said nipple forming an angular internal shoulder that abuts against the end of the cuff.

The structure as will be evident is comparatively simple, being angular in cross section, as shown in Fig. 4 and the sections are effectively held together so that there is little chance of their becoming separated.

Thus the dovetail connection between the sections and the tie strips insures a rigid and practically inseparable engagement between the parts and the binding strips are securely held together and to the tie strips. In this construction, moreover, the sections can be finished and highly polished, before they are assembled, and therefore made to match in color and material the case of the instrument with which it is used. Inasmuch as the dovetail forming channels are located solely in the outside layers, said layers will be clamped by the tie strips. By having the detachable reducer shown, said horn can be readily used in coaction with both of the two general types of sound reproducing machines now known.

From the foregoing, it is thought that the construction, operation and many advantages of the herein described invention will be apparent to those skilled in the art, without further description, and it will be understood that various changes in the size, shape, proportion and minor details of construction, may be resorted to without departing from the spirit or sacrificing any of the advantages of the invention. For instance, in Fig. 9 there is illustrated a modified form of tie strip, designated 14^a, this tie strip being constructed of sheet metal bent to produce the opposite sides and longitudinal dovetail grooves 17^a in its opposite edges.

Another embodiment of this invention is shown in Fig. 10. In this form of construction the tie strip 14^b is constructed of two pieces of sheet metal that are doubled and substantially U-shaped in cross section, forming the opposite longitudinally disposed dovetail 17^b. The abutting rear faces of the sections are soldered or otherwise secured together.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is:—

1. A sound augmenting horn, comprising a tapered cuff having an annular external shoulder between its ends, a horn body secured to the cuff, a tapered reducing sleeve that detachably fits upon the cuff and has one end abutting against the shoulder, said sleeve having an internal shoulder that abuts against the end of the cuff, and means for detachably securing the sleeve to the cuff.

2. A sound augmenting horn angular in cross section and comprising tapered sections, each section being longitudinally curved and transversely flat and each having its opposite side margins formed into continuous longitudinal dovetails, and tie strips located between the sections, each strip having longitudinal dovetailed sockets in its opposite sides that are angularly disposed with relation to each other and receive the adjacent dovetailed margins of the adjacent sections.

3. A sound augmenting horn, comprising sections, binding elements engaging the ends of the sections, and holding elements connecting the binding elements and having portions interlocked therewith.

4. A sound augmenting horn, comprising sections, binding elements engaging the ends of the sections, and holding elements connecting the binding elements, one set of elements being provided with sockets, the other having tongues that engage in the sockets.

5. A sound augmenting horn, comprising sections, binding elements engaging the ends of the sections and having sockets in their end portions, and holding clips connecting the end portions of the binding elements and having tongues that engage in the sockets.

6. A sound augmenting horn, comprising sections, tie strips connecting the longitudinal margins of the sections, binding strips engaging the ends of the sections, and clips secured to the strips and having portions interlocked with the end portions of the binding strips.

7. A sound augmenting horn, comprising sections, tie strips located between and embracing the longitudinal margins of the sections, binding strips engaging the ends of the sections and having sockets in their end portions, and clips secured to the outer ends of the tie strips, and having spaced inwardly extending tongues that engage in the sockets of the binding strips.

8. A sound augmenting horn, comprising sections, each section consisting of a plurality of layers of veneer, tie strips located between the longitudinal margins of the sections and having dovetailed connections therewith, binding strips covering the outer ends of the section and having their end portions abutted and provided with sockets, and clips covering the outer ends of the tie strips and binding strips and secured to said tie strips, said clips having inwardly extending tongues that engage in the sockets of the binding strips.

9. A sound augmenting horn, comprising a tapered cuff, sections having their inner ends fitted into the cuff, tie strips located between and secured to the sections, said strips having their inner ends located in and secured to the cuff, a tapered reducing sleeve having its larger end detachably fitting upon the cuff, said sleeve being provided at its smaller end with a tubular nipple, and a screw for detachably securing the sleeve to the cuff.

In testimony, that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

ALFRED R. CUNNIUS.

Witnesses:

MICHAEL SCHREINER,
THOS. F. WRIGHT.



H. HINKS-MARTIN, A. W. CAMERON & P. J. PACKMAN.
TALKING MACHINE.

APPLICATION FILED DEC. 28, 1908.

921,835.

Patented May 18, 1909.

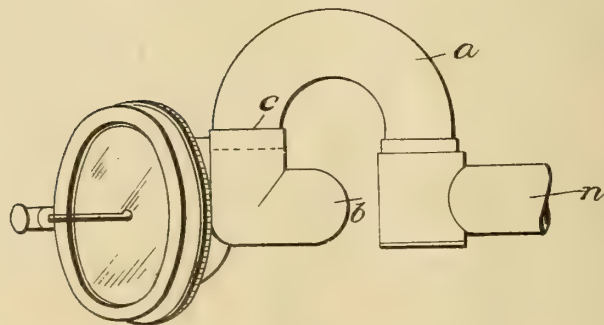
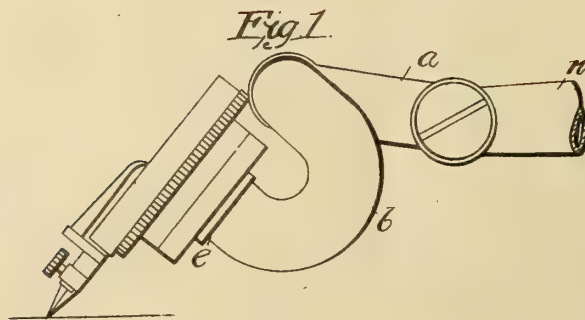


Fig. 2.

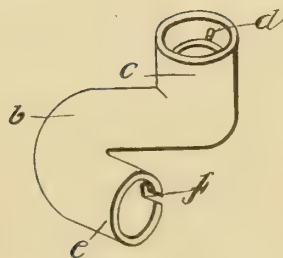


Fig. 3.

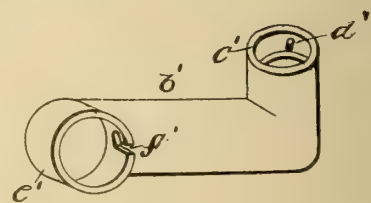


Fig. 4.

Witnesses
Jas. C. Dodge
J. H. Smith

Inventors
H. Hinks-Martin, A. W. Cameron
and P. J. Packman
By Dickinson, Hime & Witherspoon
Their Attorneys

UNITED STATES PATENT OFFICE.

HARRY HINKS-MARTIN, ALEXANDER WILLIAM CAMERON, AND PERCIVAL JAMES PACKMAN,
OF LONDON, ENGLAND.

TALKING-MACHINE.

No. 921,835.

Specification of Letters Patent.

Patented May 18, 1909.

Application filed December 28, 1908. Serial No. 469,726.

To all whom it may concern:

Be it known that we, HARRY HINKS-MARTIN, ALEXANDER WILLIAM CAMERON, and PERCIVAL JAMES PACKMAN, subjects of the King of England, residing at and whose post-office address is 23 Denmark Place, Charing Cross Roads, London, in the county of London, England, have invented certain new and useful Improvements in Talking-Machines; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to improvements in sound conveyers for talking machines, and its object is to provide an attachment for use with the U-tube or goose neck of a gramophone, whereby the position of the sound box, with relation to the record may be changed so that the same sound box may be used, in the most effective playing position, with the "hill and dale" track of a graphophone record as well as with the "zig-zag" track of a gramophone record.

In order that the best results may be produced with the "zig-zag" record, it is desirable that the sound box be disposed parallel to the tone arm or tangential to the spiral track of the record, so that the needle moving in the "zig-zag" course will properly operate the diaphragm of the sound box. So also with a "hill and dale" record, cut in a disk, the best results are produced when the needle bar and needle are disposed in radial relation to the pivotal axis of the tone arm, with the sound box disposed laterally of the vertical plane cutting said needle and tone arm's pivotal axis and hence disposed laterally of the spiral "hill and dale" track. It will be understood that, with the disk record of this type, the distance from the pivotal axis of the tone arm to the needle is substantially the same as the distance from said axis to the center of the rotating support carrying the disk record, so that the needle will swing substantially in an arc passing through the center of the record.

We are aware that it is not broadly new to provide an adapter tube or connection to enable the same sound box to be interchangeably used with a "hill and dale" or a "zig-zag" record. The present invention is, therefore, not only designed to accomplish this end, but also to accomplish it in such a man-

ner that the sound box will be properly disposed with relation to the record to produce the best results.

To more fully describe the invention reference is had to the accompanying drawings illustrating practical embodiments of the same, in which drawings like letters designate the same parts in the several views, and in which—

Figure 1 is a view in side elevation, showing the invention associated with the goose neck of a gramophone, with the sound box in the most effective position for playing a disk record of the "hill and dale" type. Fig. 2 is a plan view of same. Fig. 3 is a perspective view of the improved attachment, and Fig. 4 is a similar view of a modified form of adapter.

a shows the ordinary U-piece or goose neck used with gramophone or "zig-zag" cut records, the goose neck *a* being pivotally connected to the tone arm *n* to permit the goose neck *a* to swing vertically.

The improved attachment or adapter consists of a tubular connection represented in Figs. 1, 2 and 3 by the curved elongated portion *b* terminating at its upper end with the lateral extension *c* provided with a pin *d* operating in the bayonet slot of the goose neck, the end *c* being adapted to be detachably connected with the open end of the goose neck member. The other, or lower, end of the elongated portion *b* of the connecting tube extends upwardly and is adapted to directly receive the sound box, the upwardly directed end *e* being provided with a bayonet slot *f* forming a locking means with the usual pin of the sound box. It is obvious, however, that any other suitable attaching means may be employed at either or both ends of the connecting tube. Similarly in the modified form shown in Fig. 4 the parts *b'*, *c'*, *d'*, *e'* and *f'* correspond in principle to the construction shown in Fig. 3; but in the modified form, instead of the elongated curved portion *b*, we provide a straight tube comprising the depending portion *b'* having the lateral upper extension *c'* and the lower upwardly directed extension *e'*.

It will be observed that when it is desired to play a record of the "zig-zag" type the improved attachment is omitted and the sound box is directly connected with the open end of the goose neck, but when a "hill and dale" record is to be played the attach-

ment is affixed to the open end of the goose neck by means of the extension *c*, or *c'*, and the sound box is directly mounted on the upwardly directed lower portion *e*, or *e'*,
5 with the sound box in the most effective playing position relative to the record and with the needle in proper alinement with the axis of the tone arm.

Having thus described the invention what
10 we claim is:—

A talking machine sound conveyer comprising a sound box, a tone arm, a goose neck swinging on said tone arm and communicating therewith, and a tubular connection be-
15 tween the sound box and the goose neck, said connection consisting of a horizontal

portion, fitting said goose neck, thence extending downwardly, and thence extending upwardly and terminating axially in alinement with the axis of said tone arm, with 20 said sound box directly mounted on the upwardly projecting portion of said tubular connection, substantially as described.

In testimony whereof, we affix our signatures, in presence of two witnesses.

HARRY HINKS-MARTIN.

ALEXANDER WILLIAM CAMERON.

PERCIVAL JAMES PACKMAN.

Witnesses:

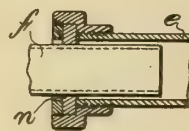
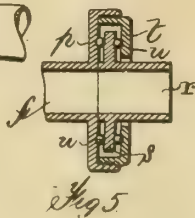
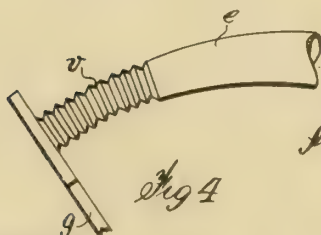
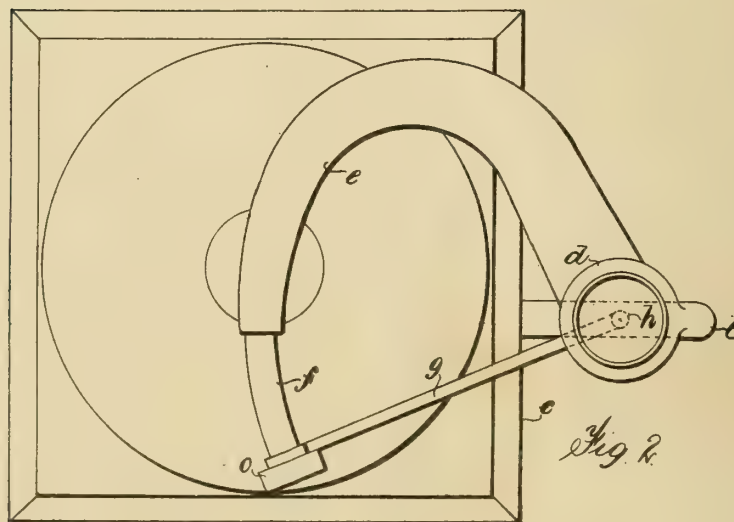
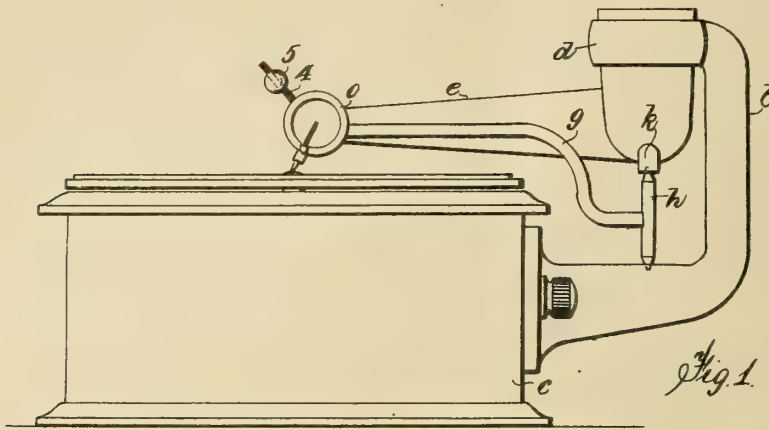
LILY SUMID,

ALEXANDER BROWNE.

J. M. LANDON.
TALKING MACHINE.
APPLICATION FILED OCT. 7, 1907.

922,297.

Patented May 18, 1909.
2 SHEETS—SHEET 1.



witnesses.
W. May Dwall.
J. H. H. H.

Inventor:
Joseph M. Landon
By William J. H. H. H.
his attorneys



J. M. LANDON.
TALKING MACHINE.
APPLICATION FILED OCT. 7, 1907.

922,297.

Patented May 18, 1909.
2 SHEETS—SHEET 2.

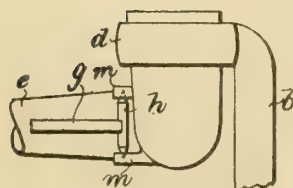
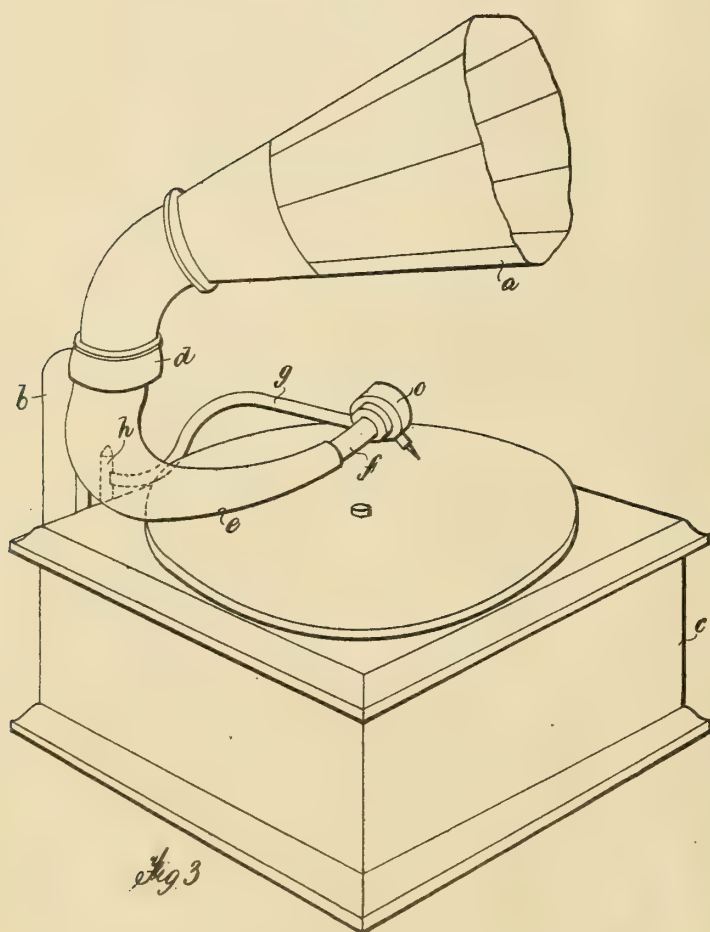


Fig. 4.
Witnesses.
Mr. Map. Durrall.
J. H. Kinsla

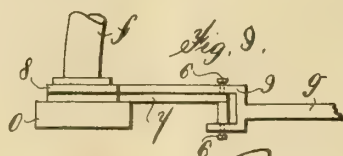
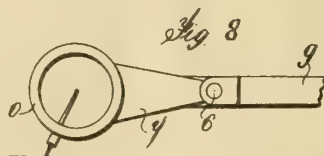


Fig. 9.
Inventor.
Joseph M. Landon
By William, John & Landon
his Attorneys.

UNITED STATES PATENT OFFICE.

JOSEPH MARGULIES LANDON, OF UPPER NORWOOD, ENGLAND.

TALKING-MACHINE.

No. 922,297.

Specification of Letters Patent.

Patented May 18, 1909.

Application filed October 7, 1907. Serial No. 396,306.

To all whom it may concern:

Be it known that I, JOSEPH MARGULIES LANDON, a subject of the King of England, residing at 20 Central Hill, Upper Norwood, in the county of London, England, have invented certain new and useful Improvements in or Relating to Talking-Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to talking machines and consists firstly in so constructing such machines as to produce, with a single trumpet, immovable during playing, a better result than has hitherto been attainable with talking machines as at present constructed.

According to the first feature of this invention, I provide a tubular piece to one end of which the reproducer is attachable. This tubular piece is carried by means of an arm suitably pivoted and is so formed and arranged as to telescope into the smaller end of the trumpet which is suitably formed for its reception, or it may be connected therewith by an accordion joint or other suitable means. The arm may, if desired, be actuated by suitable mechanism connected with the motor. This will be particularly desirable when the machine is used for recording. According to one way of carrying out this part of my invention, I bend the smaller end of the trumpet and shape it so as to form a portion of a circular tubular ring. I also provide a tubular piece of similar curvature carrying at one end the sound box, the other end telescoping into or over the curved end of the trumpet before referred to. This tubular piece is carried at the end of a rod which is so pivoted as to move in a plane parallel to the plane of the record, and the radius of curvature of the smaller end of the trumpet and of the piece connected to the sound box and carried by the arm is equal to the length of the arm.

The reproducer I may connect to the tubular piece so as to allow the vertical motion necessary during playing. This may be done by a ball and socket, or I may connect it to a separate pivoted arm as hereinafter described.

The bell portion of the trumpet may be made to turn so as to project the sound in any required direction. A suitable rest or

bracket may be provided to take the weight of the reproducer when not in use.

The first feature of my invention may be produced by a modified construction in which I swing a short piece of tube (similar to a pendulum) on to the end of the trumpet, the other end of such piece of tube carrying the sound box and provide suitable mechanism for keeping the stylus in the proper position throughout the track of the record.

Referring to the first part of my invention, Figure 1 shows side elevation of the machine; Figure 2 shows plan of same; Fig. 3 shows perspective view of same; Figs. 4 to 9 show details hereinafter referred to.

a, Fig. 3, is the bell portion of the trumpet, *b* shows a bracket screwed to the casing *c* of the machine. The bracket *b* is provided at its upper end with a ring *d* in which the lower end *e* of the trumpet is held. The portion *e* of the trumpet is held in the ring *d* so that it is immovable during playing but independently adjustable as desired, and this part *e* is preferably tapered in form, and its upper portion projects into the upper or bell portion of the trumpet. It is also bent at its lower portion as hereinafter described, *f* is a tubular piece bent to the same curvature as the lower portion *e* of the trumpet, into which it telescopes. This tubular piece *f* is carried by an arm *g* carried by a pivot pin *h*. The tubular piece *f* is enabled to telescope easily into and out of the part *e* on account of the radius of curvature of the tube *f* and the part *e* being approximately the same, namely, a circle struck from the axis of the pivot *h* at the distance of the axis of the tube, as shown clearly at Fig. 2.

I prefer that the tube *f* may telescope into the part *e* somewhat loosely so that no actual frictional contact shall be present. The pivot pin *h* takes at one end in the bracket *b* and the other end in the socket *i* placed in the center of the upper portion of the part *e* of the trumpet, so that in whatever position the portion *e* may be turned the tube *f* may telescope easily therein. To direct the same object I may place the pivot pin *h* in the *j* attached to the turned-up portion of the part *e* as shown clearly at Fig. 7.

At Fig. 6 a modification is shown in which the part *e* has fitted at the end a washer *k*. *l* is the sound box attached to the sliding tube *f*. One method of attachment is shown in detail at Fig. 8. In this figure the tube *f* has

fixed to or formed therewith a flange *p*. The tube *r* to which the sound box is attached is furnished with a flange *s*. *t* is a screw cap screwing on to the flange *p*. On either side of the flange *s* and between the cap *t* and the flange *s*, balls *u* are interposed. By this construction the needle of the sound box is enabled to rise and fall easily as it passes over the record owing to the motion of the sound box around the axis of the tube, the sound box being also suitably weighted to facilitate this.

In consequence of the above construction the machine is adapted to play disk records of different sizes due to the fact that the arm *e* may be turned on its pivot at the bracket *b*, and its outer end brought nearer the periphery of the record; thus enabling the use of an arm *f* having a fixed length irrespective of the size of the record.

At Fig. 4 another form of the invention is shown in which the telescoping tube *f* is replaced by an accordion joint *v* between the sound exit tube from the sound box *c* and the lower part *e* of the trumpet. It will be easily understood that the principle of the invention is precisely the same in this case as the sound box tube is carried by the arm *g* as before mentioned.

In place of arranging the arm *g* horizontally I may, in some cases, suspend this vertically, somewhat in the form of a pendulum, and provide suitable slots and guides to keep the sound box in the correct position with respect to the record as it travels across same.

Although the invention has been described as applied to reproducing from a record it may also be applied to recording, in which case it would be necessary to move the arm *g* mechanically across the disk during the process of recording, by mechanism which may be actuated by the driving motor. It will be understood that this part of the invention may be modified in various ways while retaining its essential feature, namely that of having the lower end of the trumpet fixed and having the movable tube carrying the sound box supported by means of a pivoted rod or its equivalent in such a way that the sound box may travel across the disk toward the end of the trumpet or vice versa.

Another modification of one feature of this invention is shown in Figs. 8 and 9, wherein I pivot or hinge at 6 to the pivoted arm *g* a short arm 7, which arm may be partly formed with the back of the sound box, and the hole in the back of the sound box and this arm piece coincides with the hole in the tube *f*, to the end of which tube a disk 8 is connected which comes close to the back of the sound box or small arm 7. A washer of leather or other suitable soft material may be interposed between these two metal surfaces to prevent rattling when playing. On the drawings this arrangement is shown as ap-

plied to the pivoted arm *g* by means of the fork 9 but the arm 7 might be hinged or pivoted to the lower end of an ordinary trumpet or that portion known as the "tone arm," in which case the lower end of the tone arm or trumpet would be suitably bent round to adapt it to this arrangement.

What I claim is:—

1. A sound-reproducing machine comprising in combination a turntable adapted to receive a record, a sound box carrying a stylus, a hollow curved member adapted to remain in a fixed position during rotation of the turntable but capable of independent adjustment and guiding the sound box, at one end, and means whereby said sound box is adapted to move across the turntable in a prolongation of the arc formed by the curved member, and means for permitting the stylus to be moved up and down during said movement of the sound box.

2. A sound-reproducing machine comprising a turntable adapted to receive a record, a sound box, a hollow curved member having a fixed position during rotation of the turntable and extending over said turntable, a hollow curved member guiding the sound box at one end and telescoping at its other end in the fixed hollow curved member, said curved members being approximately arcs of a circle having a given radius and the same center whereby the member carrying the sound box can move into and out of the fixed curved member, and means for guiding the said box and carrying member during their movement.

3. A sound-reproducing machine comprising in combination, a turntable adapted to receive a record, a sound box, a fixed hollow curved bearing extending over the turntable, a hollow curved member guiding the sound box at one end and adapted to telescope at its other end in the curved bearing whereby the member carrying the sound box can move into and out of the curved bearing, and means for guiding the sound box and its carrying member during their movement.

4. A sound-reproducing machine comprising in combination, a turntable adapted to receive a record, a sound box carrying a stylus, a fixed hollow curved bearing extending over the turntable, a hollow curved member guiding the sound box at one end and adapted to telescope at its other end in the curved bearing whereby the member carrying the sound box can move into and out of the curved bearing and means for permitting an upward and downward movement of the stylus, and means for guiding the sound box and its carrying member in their horizontal movement.

5. A sound reproducing machine comprising in combination a turntable adapted to receive a record, a sound box, a fixed hollow curved bearing extending over the turn-

table, a hollow curved member guiding the
sound box at one end and adapted to tele-
scope at its other end into the curved bear-
ing, whereby the member carrying the
5 sound box can move in and out of the curved
bearing, and an arm pivoted at the center
from which the curvature of the fixed hollow
bearing is struck for guiding the sound box

and its carrying member during their move-
ment, substantially as set forth.

19

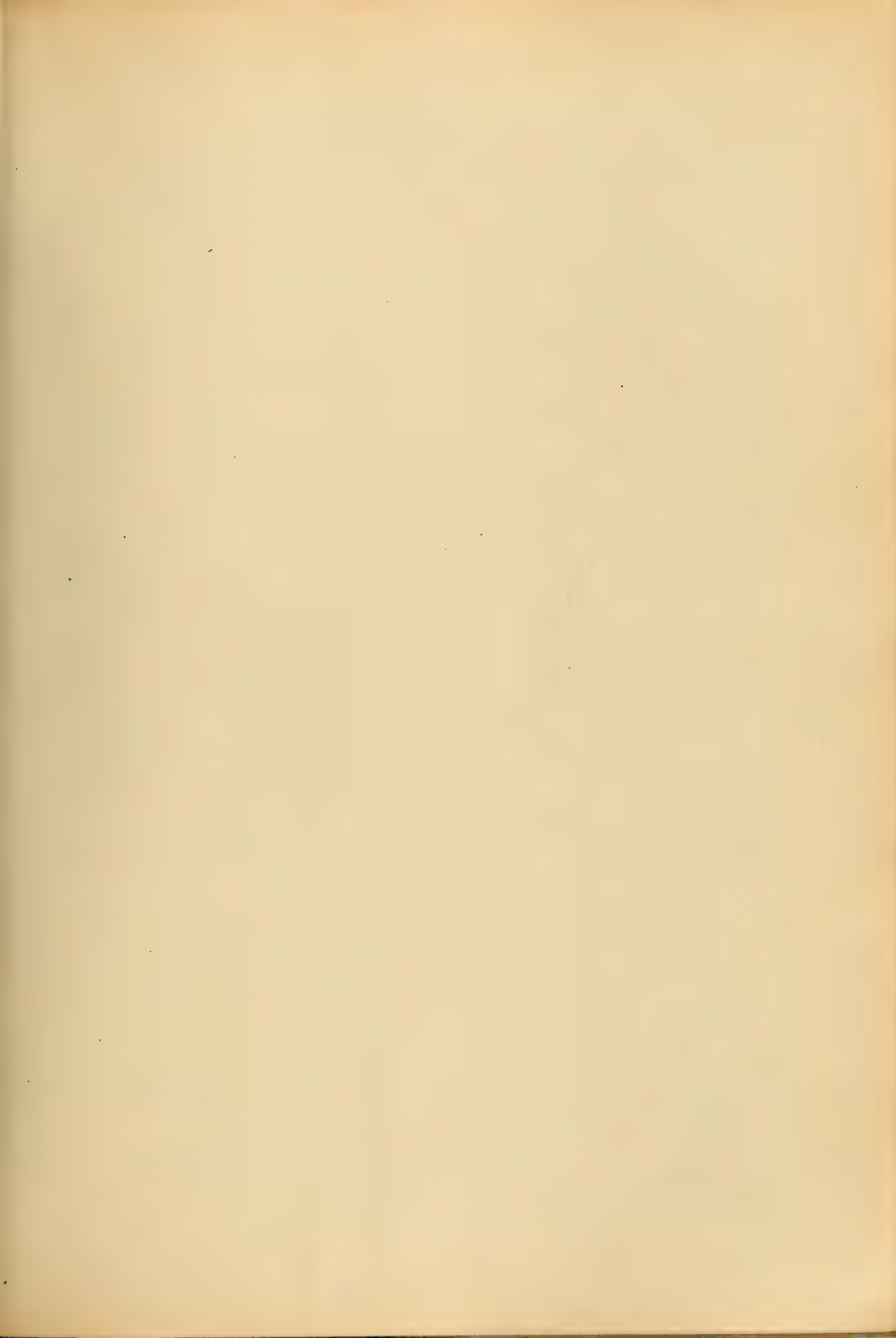
In testimony whereof, I affix my signa-
ture, in presence of two witnesses.

JOSEPH MARGULIES LANDON.

Witnesses:

A. BROWNE,

H. D. JAMESON.

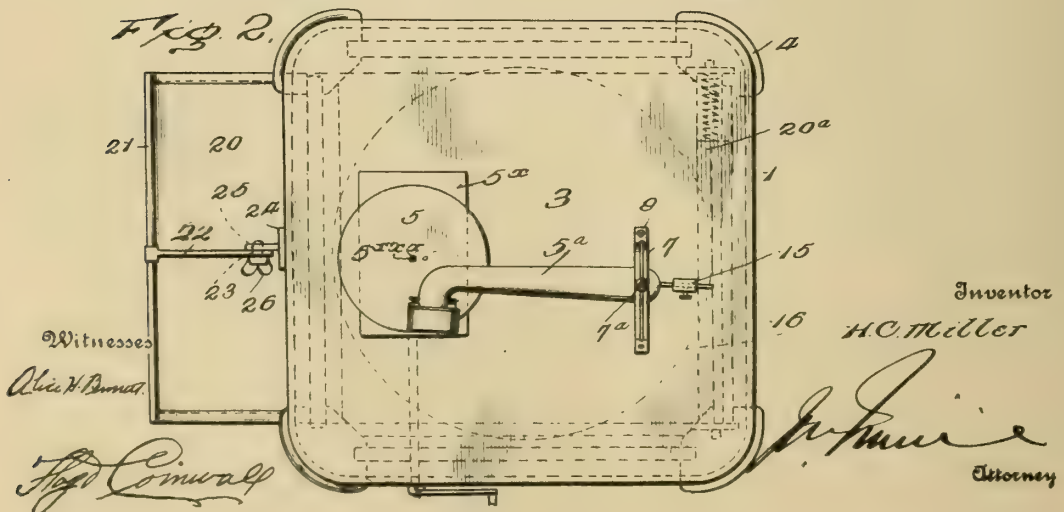
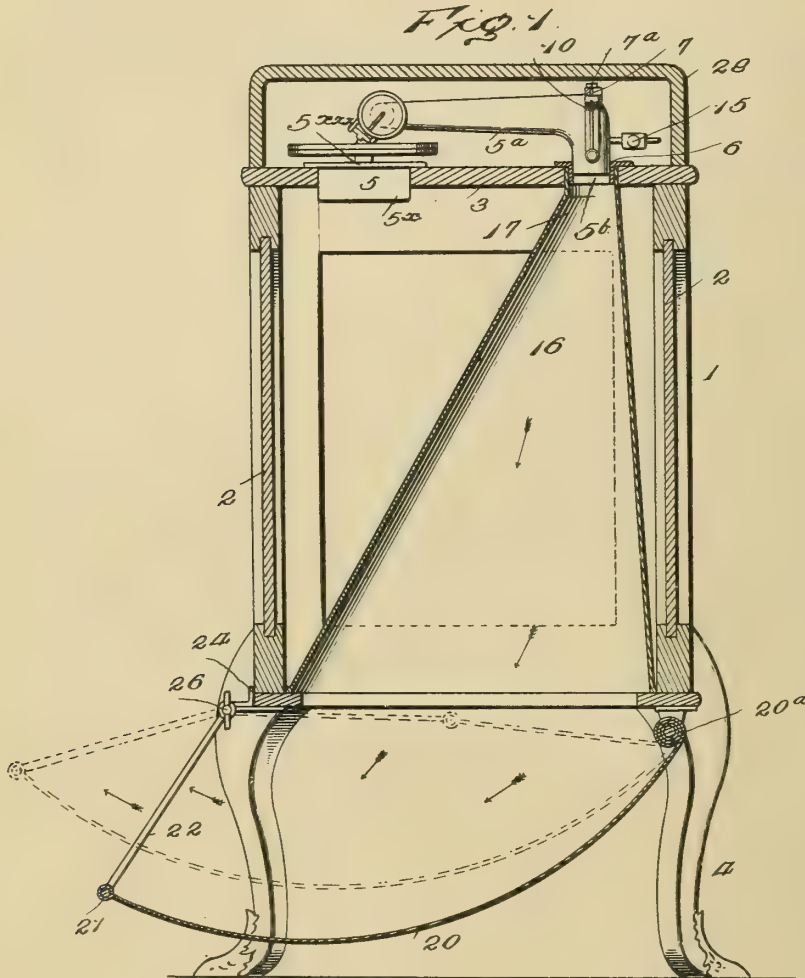


H. C. MILLER.
 COMBINED STAND AND HORN FOR TALKING MACHINES.
 APPLICATION FILED JUNE 20, 1907.

Reissued May 25, 1909.

12,963.

3 SHEETS—SHEET 1.

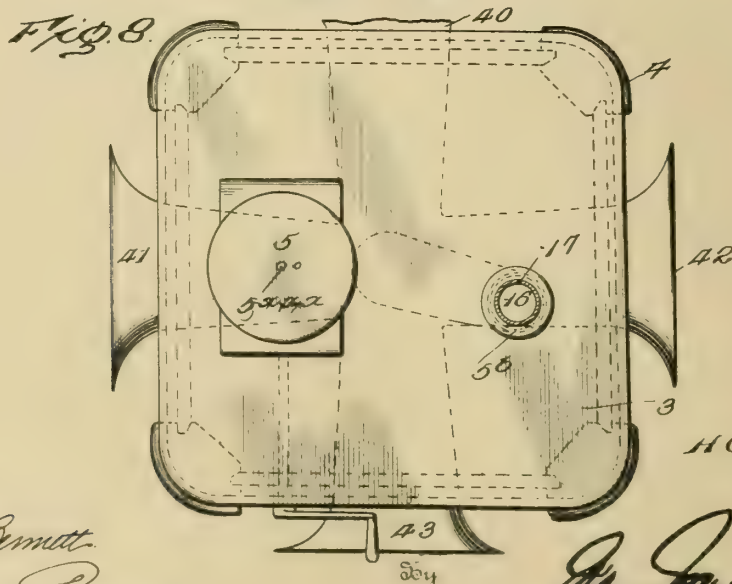
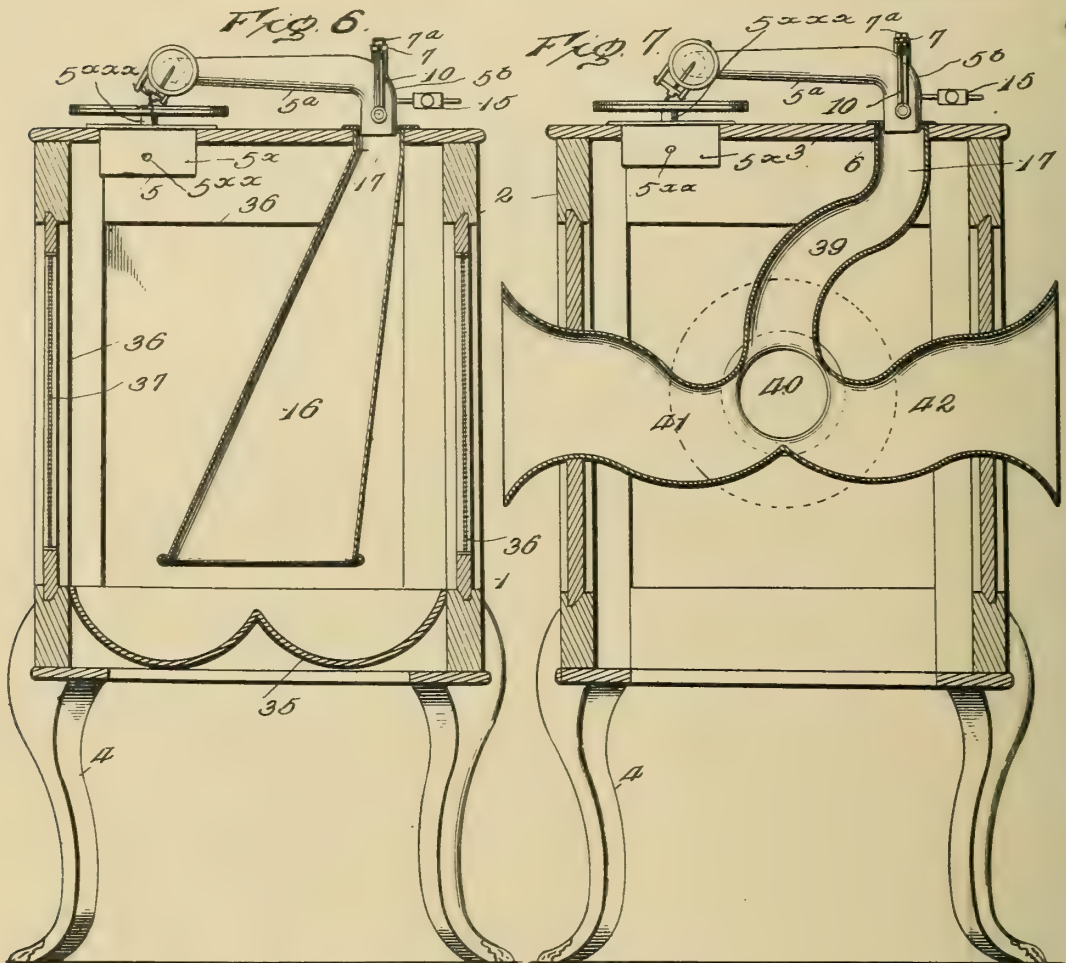


H. C. MILLER.
 COMBINED STAND AND HORN FOR TALKING MACHINES.
 APPLICATION FILED JUNE 20, 1907.

Reissued May 25, 1909.

12,963.

3 SHEETS—SHEET 2.



Inventor

H. C. Miller

Witnesses

Alice K. Bennett.

Edw. Conwell

J. J. Muir

Attorney



Reissued May 25, 1909.

3 SHEETS—SHEET 3.

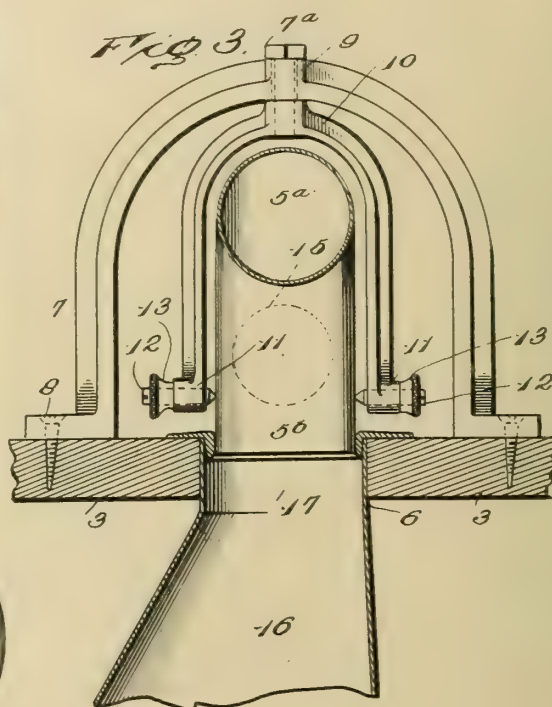
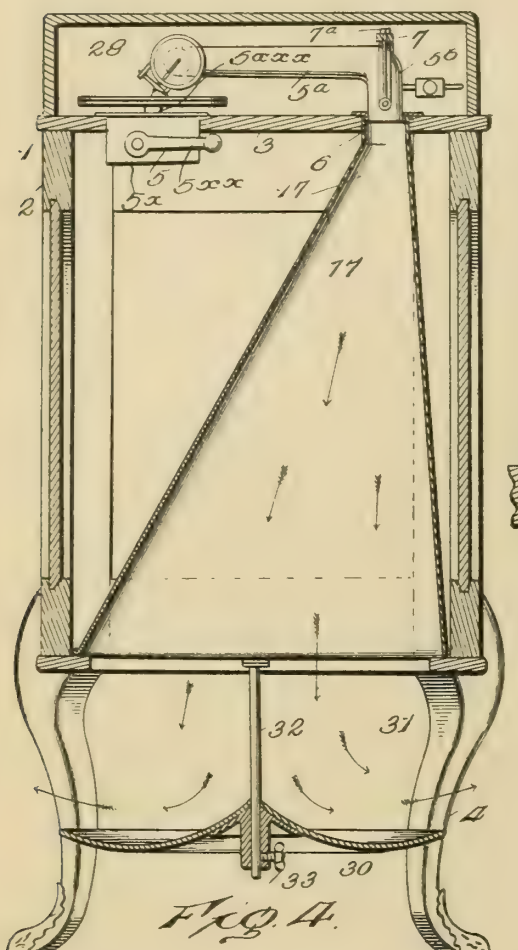
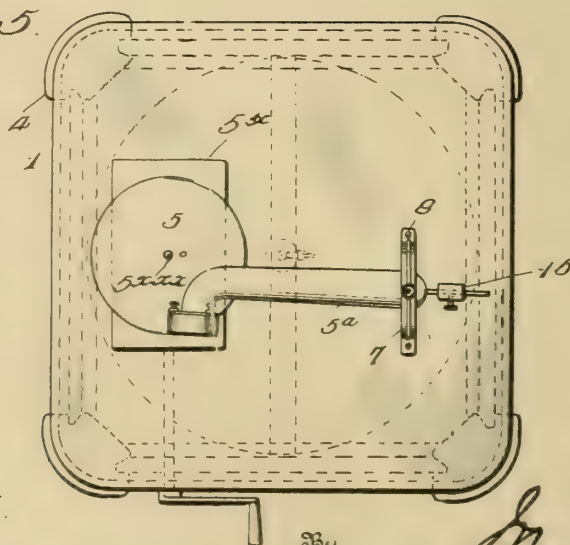


Fig. 5.



Witnesses

Alice H. Bennett.

Frederic Comwall

३५

Inventor

H.C. Miller

Johnnie
Attorney

UNITED STATES PATENT OFFICE.

HENRY C. MILLER, OF WATERFORD, NEW YORK, ASSIGNOR, BY MESNE ASSIGNMENTS, TO VICTOR TALKING MACHINE COMPANY, OF CAMDEN, NEW JERSEY, A CORPORATION OF NEW JERSEY.

COMBINED STAND AND HORN FOR TALKING-MACHINES.

No. 12,963.

Specification of Reissued Letters Patent. Reissued May 25, 1909.

Original No. 793,013, dated June 20, 1905, Serial No. 235,722. Application for reissue filed June 20, 1907. Serial No. 379,993.

To all whom it may concern:

Be it known that I, HENRY C. MILLER, a citizen of the United States, residing at Waterford, in the county of Saratoga and State of New York, have invented new and useful Improvements in a Combined Stand and Horn for Talking-Machines, of which the following is a specification.

This invention relates to improvements in a combined stand and horn for a talking-machine.

Talking-machines now in use employ a horn extending out from the sound-box which is large, unsightly, and frequently takes up so much room that it is in the way. I have found that it is not essential to extend the horn from the machine and have therefore constructed a cabinet in which the talking-machine is placed and utilize the interior of the cabinet to accommodate a horn, and a deflector to distribute the sound. The object of combining these two elements is to economize space and at the same time provide means for utilizing a large horn without projecting it out from the talking machine, as practiced with machines of this type now in use.

A further object of this invention is to provide a stationary horn in a cabinet with an adjustable exit that the sound may be directed to an audience at any angle.

Other objects and advantages will be hereinafter referred to and be particularly pointed out in the claims.

In the drawings, Figure 1 is a sectional view of the preferred form of my invention. Fig. 2 is a top plan view with the cover removed. Fig. 3 is a detail transverse vertical section of the means employed for supporting the pipe leading from the talking-machine to the horn and the connection between the pipe and the horn. Fig. 4 is a vertical sectional view of a modified form of my invention. Fig. 5 is a plan view of the same. Fig. 6 is a vertical section of a different modification. Fig. 7 is a similar view of a further modification. Fig. 8 is a plan view of the modification shown in Fig. 7.

The numeral 1 indicates a cabinet composed of sides 2, top or support 3, and legs 4.

The top 3 is cut out to receive a talking-machine 5, which may be of any well-known type, and connected to the sound-box is a tube 5^a, having the outer end 5^b turned down. The talking machine includes a casing 5^x, extending within the cabinet below the support 3, and includes operating means, parts of which are indicated by the handle 5^{xx}, and the disk post 5^{xxx}. An opening 6 is formed in the top 3 opposite the talking-machine, and straddling the opening is a yoke 7 fastened in place by screws 8, and provided at about its center with a vertical opening 9, the center of said opening being coincident with the center of the opening 6. A smaller yoke 10 is swiveled to the yoke 7 by a bolt 7^a, passing through the opening 9, and at the terminals of the yoke 10 are aligned openings 11 11 to receive pointed screws 12 12, which receive lock nuts 13 13. The points of the screws 12 bind the turned-down end 5^b of the tube 5^a to fasten the latter to the yoke 10. This construction permits the tube to turn horizontally, the screw 7^a being the pivotal connection. A weight 15, is mounted on a rod extending from the tube to counterbalance the tube and the sound box.

16 indicates a horn made conical, its smaller end 17, fitting in the opening 6 and its larger end or mouth extending to the bottom of the cabinet 1. A suitable packing is interposed between the turned-down end 5^b of the tube 5^a and the upper end 17 of the horn. Obviously the purpose of the packing is to prevent the escape of sound at this point.

Connected to the bottom of the cabinet and communicating with the horn is arranged an adjustable flexible sound-deflector 20. The deflector may be secured to the bottom of the cabinet in any suitable manner, but preferably by a spring-roller 20^a, and at its front end is a bar 21, having connected to it an arm 22, provided with an opening 23. Adjacent the arm is a bracket 24, fastened to the cabinet and formed with an opening 25. A set-screw 26 passes through the openings 23 and 25 to set the mouth of the deflector at a convenient angle. By making the deflector of flexible material it can be rendered adjustable without the necessity of making

joints, &c., which would retard the sound waves.

The spring-roller 20^a is of the usual type and can be used to roll the deflector under the cabinet when not in use.

While I have described one form of means for holding the deflector after it has been adjusted, I desire it to be distinctly understood that it is in no wise intended as a limitation.

28 indicates a cover hinged to the cabinet to shield the talking-machine.

In operation the talking-machine is started and the sound passes through the tube 5^a to the horn 16, thence to the deflector, and out to the atmosphere. The sound striking the deflector is thrown out into the atmosphere in a soft blended tone. The "brassy" sound so prevalent with talking-machine horns is almost entirely removed.

By swiveling the tube at one end, as described, the end of said tube and the horn are always retained in alinement.

In the modification shown in Figs. 4 and 5 the horn 16 and its connection with the talking-machine are the same as in Figs. 1 to 3; but the deflector is made in the form of a concavo-convex disk 30, and the space 21 is formed between the bottom of the horn and the disk for the exit of sound. The disk is formed with a central hole which receives a standard 32, depending from the bottom of the cabinet, the disk being secured to the standard by a set-screw 33, so that the volume of sound emitted through the space 31 can be quickly and conveniently controlled.

In the form of my invention shown in Fig. 6 a concavo-convex disk 35 is located inside the cabinet 1, and the sound passes to the atmosphere through opening 36, covered with net or fine gauze 37. In many instances this construction gives decidedly satisfactory results; but by reason of it not having an adjustable deflector the sound cannot be regulated.

From the foregoing it will be seen that I have provided a simple and neat stand for a talking-machine and have also arranged a convenient means for accommodating the horn. Such a construction as before stated, absolutely removes the unsightly and awkward appearance of the horn extending from the talking machine. Furthermore, by providing the adjustable deflector the range, tone, and volume of sound is under perfect control of the operator.

In Figs. 7 and 8 I have provided the horn 39 with four branches 40, 41, 42, and 43, a branch passing through an opening in each side of the cabinet and forming a deflector. The area of the branch tubes about equals the area of one of the big horns shown in Fig. 1, so that the sound produced is equal in volume to the preferred form.

It will be seen from the foregoing that my invention has for its object, among others, to

provide improvements in apparatus for reproducing sound from a record of the same, by means of which the quality and naturalness of the recorded sounds are reproduced with greater faithfulness and also with a reduction of the commingled, extraneous sounds which are usually present, and which appear to be made by the operation of the reproducing apparatus, for instance, among others the scratching usually produced by the contact of the reproducing stylus and record when reproducing, and other sounds given out by parts of the apparatus when in operation, among which may be mentioned the sounds that might be made by the motor when operating. Among the other objects of my invention is to provide apparatus for imparting resonance to the reproduced sounds; to modify such sounds after amplification; to deflect the sounds after amplification, and to protect and conceal the operative parts of the apparatus to improve the appearance of the talking machine as a whole, so as to provide an ornamental piece of furniture.

One of the foregoing objects of my invention, namely, the improvement in the quality and naturalness of the reproduction, and which is accomplished in my apparatus, is due to the inclosing of the stationarily mounted amplifier, shown in the different figures of the drawings, and is not dependent upon the means for modifying or deflecting the sound, nor for preventing the scratching from commingling with the reproduced sounds, that is to say, I have found it in practice that so inclosing the amplifier does improve the quality and naturalness of the reproduced sound, and having secured such new result, I desire to claim broadly, an apparatus embodying such means. I have also found that when there is an air space between the amplifying means and its inclosing casing, improved results appear to be attained, and still more so when this air space between the amplifying means and its casing may be open to the atmosphere, so that sounds therein may commingle with the sounds emanating from the interior of the amplifier. This part of my invention rests for its novelty upon the new results which are accomplished thereby, namely,—(1) the inclosing of the amplifier; (2) the formation of the air space around said amplifier; and (3) the opening of said air space as described, as hereinbefore claimed, and are three different subdivisions of this part of my invention, and, as before stated, are independent of the means of modifying and deflecting the sounds after amplification, or the means by which the commingling of the scratching and the amplified sounds is reduced. I have also found that such amplifier so arranged acts as a resonator, or, in other words, it provides a combined amplifier and resonator, by which resonance is im-

parted to the amplified sounds which, of course, is an advantage and a new result, and, although I append hereto claims to cover such a structure, my broad invention
5 of employing an inclosed resonator, or an inclosed combined amplifier and resonator is not limited to cross sectional shape thereof.

In addition to the results I have just described there is, of course, the modification
10 and deflection of the reproduced sounds after amplification, which is accomplished by the deflectors described, although it will be understood that such a sound deflector and modifier could be arranged in various other
15 shapes.

It is obvious that by inclosing the reproducing apparatus within the compartment formed by the cover 28, I am enabled to reduce the amount of scratching which com-
20 mingles with the sounds emanating from the combined amplifier and resonator, and also the sounds that emanate from the outside of the diaphragm, which would otherwise comingle with the amplified sound to which
25 resonance has been imparted, are reduced.

If preferred, the motor or operating means can be inclosed within the casing 5*, and when so inclosed said casing serves to confine, to a great extent, therein, any noises
30 which might be caused by the said operating means when in operation.

In addition to the improvement in the quality and naturalness of the reproduction by inclosing the amplifier, it is manifest, of
35 course, that the appearance of the complete apparatus is made much more pleasing, and permits a greater latitude in improving the appearance of the device.

For the purpose of preventing extraneous
40 forces from interfering with the vibration of the amplifier walls, or, in other words, preventing extraneous vibration of the amplifier and detracting from the purity of the tone reproduced, means are provided for em-
45 bracing the major portion, or one of the sections, of the amplifier, and this means may vary within wide limits. In the best constructions, however, this embracing means will consist of an inclosure in which the major
50 portion of the amplifier is located. The inclosure may be variously located. In the best constructions, however, it will be so located as to embrace the major portion of the amplifier in a position below the record and
55 talking machine. The amplifier may be variously located within the inclosure, and the inclosure itself will serve as a rigid support for the major portion of the amplifier. The inclosure being stationary and the major portion
60 of the amplifier being rigidly supported by the inclosure, it follows that the major portion of the amplifier is supported in a fixed position within the inclosure, and below the record and talking machine. In the
65 best constructions, the inclosure is formed

by the walls and partitions of the cabinet inclosing the entire apparatus.

For the purpose of preventing extraneous noises from detracting from the purity of the tone reproduced, means are provided for iso-
70 lating extraneous noise from the sounds or tones issuing from the amplifier. As hereinbefore explained, the noise produced by the operating mechanism of the talking machine is isolated by its inclosure in a compartment.
75 Other noises detrimental to the purity of the reproduced tone are, however, found in machines heretofore constructed. Means are provided, therefore, for isolating the noise
80 produced by the contact of the reproducer stylus with the record from that issuing from the amplifier, and this means may vary within wide limits. In the best constructions, this means consists in a compartment in
85 which the record and reproducer are located.

It is understood, of course, that my invention is not confined to the particular form of apparatus herein shown and described, and, therefore, I claim broadly the right to employ all equivalent instrumentalities coming
90 within the scope of the claims, and by means of which objects of my invention are attained, and the new results accomplished, as herein set forth, as it is obvious that the particular embodiment herein shown and de-
95 scribed is only one of many that can be employed to attain these objects and accomplish these results.

What I claim is—

1. In combination, a casing having a sup-
100 port for a talking machine, legs supporting the casing and forming a space at the bottom of the casing, a horn extending downwardly below the support and terminating to dis-
105 charge sound in the space, and a deflector at the bottom of the horn, the horn being inclosed by the casing.

2. In combination, a casing having a sup-
support for a talking-machine, a horn extending
110 downwardly below the support, a deflector at the bottom of the horn, the horn being inclosed by the casing, a tube adapted to com-
115 municate with the talking-machine and the upper end of the horn, and a swiveled connection at the end of the tube which com-
120 municates with the horn, said connection comprising a stationary standard, a yoke connected to the tube and swiveled to the standard.

3. In combination, a casing having a sup-
120 port for a talking machine, legs supporting the casing and forming a space at the bottom of the latter, a horn extending downwardly below the support and terminating to dis-
125 charge sound in the space, and a deflector at the bottom of the horn and mounted in the space, a tube adapted to communicate with a talking-machine, the tube and horn being inclosed in the casing.

4. In combination, a casing having a sup- 130

port for a talking machine, a horn inclosed by the casing, and a flexible deflector at the mouth of the horn.

5 5. In combination, a casing having a support for a talking machine, a horn inclosed by the casing, a flexible deflector at the mouth of the horn, and means for adjusting the deflector.

10 6. In combination, a casing having a support for a talking machine and a space formed below the casing, a horn inclosed by the casing and extending downwardly to the bottom of the casing, and an adjustably-mounted deflector in the space and adjacent the mouth of the horn.

15 7. In combination, a casing having a talking machine support, a cover over the support to form a separate compartment for the talking machine, a horn depending from the support, a tube above the support and adapted to communicate with a talking-machine and the horn, the horn being inclosed within the casing below the support, and a deflector at the mouth of the horn.

20 8. In combination, a casing, a support in the casing, a horn projecting through an opening in the support, a tube communicating with a talking-machine and the horn, a hanger, a yoke secured to the tube, and a swiveled connection between the yoke and hanger, the horn being inclosed in the casing.

30 9. In combination, a casing, a support for a talking-machine, a horn within the casing, and extending downwardly toward the bottom of the same, a flexible deflector at the bottom of the casing and communicating with the mouth of the horn, and means for adjusting the mouth of the deflector.

40 10. In combination, a stand for a talking-machine, a horn within the stand, a flexible deflector adjacent the exit of the horn, and means for folding the deflector when not in use.

45 11. In combination, a stand for a talking machine, a horn inclosed within the stand, a flexible deflector at the mouth of the horn, means holding the deflector open, and means for folding the deflector when not in use.

50 12. In combination, a stand for a talking machine, a horn inclosed within the stand with its mouth at the bottom of the latter, a flexible deflector under the stand and opposite the mouth of the horn, means holding the deflector open, and spring-actuated means for folding the deflector under the stand.

55 13. A casing having a shelf or wall dividing it into two compartments, a talking machine supported by said shelf, only the record support, reproducer and reproducer connections being on one side of said shelf in one compartment, said connections extending to said shelf, and a sound amplifier in the other compartment communicating with the outside and with said connections.

65 14 In combination, a casing having a

talking machine support, a cover over the support, a talking machine casing extending in the cabinet below the support, a talking machine including a reproducer, the latter being in the compartment formed by the cover, a sound conveyer extending from the sound reproducer toward the support, a horn connected to the sound conveyer, said horn being inclosed in the cabinet below the support, and a deflector at the mouth of the horn.

70 15. A talking machine comprising a casing, a movable deflector for said casing, a talking machine including a sound reproducer, a sound conveyer extending from said sound reproducer toward said deflector, and a partition separating said reproducer from said sound conveyer.

80 16. A casing having a sound deadening partition dividing it into two compartments, a talking machine mounted in one of said compartments, only the record support, reproducer and reproducer connections being on one side of said sound deadening partition, said connections extending to said sound deadening partition, and a sound amplifier in the other compartment communicating with the outside and with said connections.

95 17. A talking machine comprising a casing, a movable deflector carried by said casing, a sound reproducer within said casing, means for operating said reproducer, a sound conveyer extending from said reproducer toward said deflector, and a wall within the casing separating said reproducer from said sound conveyer.

100 18. A sound reproducing machine, comprising a casing, an adjustable deflector for said casing, a sound reproducer within said casing, an inner casing, operating means in the inner casing, a sound conveyer extending from said reproducer toward said deflector beneath said inner casing.

110 19. A sound reproducing machine comprising a casing having an opening, a sound reproducer inclosed within the casing, an inner casing, a horn extending below said latter casing, a sound conveyer connecting said reproducer with said horn, and an adjustable deflector operable to cover the opening and the mouth of the horn.

115 20. A sound reproducing machine comprising a casing, a removable cover upon said casing, a sound reproducer within said casing, a compartment within said casing, talking machine operating mechanism within said compartment, a horn, a sound conveyer connecting said reproducer with said horn, a hinged deflector carried by the said casing adjacent said horn to deflect and modify the reproduced sound.

125 21. A sound reproducing machine comprising a casing formed with an opening and having two compartments, a sound repro- 130

ducer within one of the compartments, operating means, a swinging sound conveyer extending from the reproducer to one wall of the compartment containing said reproducer, a horn located in the other compartment and extending from the sound conveyer to the opening in the casing.

22. The combination with a talking machine and horn connected thereto, of a casing completely inclosing said talking machine and horn, and a swinging deflector located adjacent the mouth of said horn for modifying the sound emitted from the horn.

23. In combination, a cabinet having two compartments separated by a partition, a talking machine having its operating mechanism below the partition, a reproducer, a horn inclosed in one of the compartments, a sound conveyer extending from the reproducer to the horn, and a cover for the compartment containing the reproducer.

24. A talking machine comprising a casing provided with an opening and having a hinged cover, a partition adjacent the cover, talking machine operating means supported beneath the partition, a talking machine including a sound reproducer, said reproducer being above the partition and accessible by moving the cover, and a horn extending from the reproducer to the opening in the cabinet.

25. In combination, a cabinet formed with an opening and having a partition, a talking machine including a reproducer, a part of the talking machine being on one side of the partition, all of the parts of the talking machine including the reproducer being entirely inclosed within the cabinet to deaden the sound, and a sound conveyer and sound amplifier also inclosed within the cabinet and connected to said reproducer for communicating the sound to the atmosphere, the mouth of the sound amplifier fitting snugly the opening in the cabinet.

26. In combination, a cabinet formed with an opening and having a partition for forming two compartments, a talking machine including a reproducer, a part of the talking machine being on one side of the partition in one of the compartments, all of the parts of the talking machine including the reproducer being entirely inclosed within the cabinet to deaden the sound, a swinging sound conveyer communicating with the reproducer, a stationary sound amplifier also inclosed within the cabinet and communicating with the sound conveyer and the amplifier, the partition being located to separate the reproducer from the mouth of the amplifier.

27. In combination, a cabinet formed with an exit opening and having a partition for forming two compartments, a talking machine including a reproducer, a part of the talking machine being on one side of the partition in one of the compartments, the repro-

ducer being in the other compartment and entirely inclosed within the cabinet to deaden the sound, a sound conveyer and sound amplifier also inclosed within the cabinet and connected to said reproducer for communicating the sound to the atmosphere, the partition being located to separate the reproducer from the mouth of the amplifier.

28. In combination, a casing having a support, a cover over the support and with the same forming a separate compartment, a talking machine mounted on the support and including a reproducer operating in the compartment, a swinging sound conveyer connected to the reproducer, a stationary horn communicating at one end with the sound conveyer, and a pivoted connection between the sound conveyer and the stationary horn.

29. A casing formed with an opening and a shelf having a talking machine supported thereon, only the record support, reproducer and reproducer connections being on one side of said shelf, a sound amplifier in the compartment on the other side of the shelf and communicating at one end with said connections, and its opposite free end contacting with the casing and communicating with the opening in said casing.

30. A casing having a partition formed with an opening and dividing it into two compartments, one of said compartments having an opening, a talking machine within the casing, only the record support, reproducer and reproducer connections being on one side of said partition in one compartment, said connections extending to the opening in the partition, the sound passing to the atmosphere through the opening in the other said compartment.

31. In combination, a casing opened at its bottom and having a support, a talking machine carried by the support, legs supporting the casing to form a space at the bottom of said casing, a horn within the casing, the mouth of the horn registering with the opening in the bottom in the casing to allow the sound from the record carried by the talking machine to diffuse between the legs, and means connecting the talking machine with the horn.

32. In combination, a casing open at its bottom and having a support, a talking machine carried by the support, amplifying means in the casing, means connecting the amplifying means with the talking machine, means supporting the said casing, the said supporting means forming openings which communicate with the opening in the bottom of the casing, the said openings diffusing the sound from the amplifying means in more than one direction.

33. In combination, a cabinet formed with two openings, means for amplifying sound, said amplifying means fitting snugly the

openings in the cabinet, a talking machine including a reproducer, and sound conveyer outside the compartment and communicating with the amplifying means.

34. In combination, a casing having a support, a cover over the support and with the same forming a separate compartment, a talking machine including a reproducer operating in the compartment, a movable sound conveyer connected to the reproducer, a stationary amplifier communicating at one end with the sound conveyer, and a connection between the sound conveyer and the stationary amplifier to permit movement of said sound conveyer.

35. In combination, a cabinet formed with an opening and having a partition also formed with an opening, the partition dividing the compartment into two compartments, a talking machine including a record support and reproducer inclosed within the cabinet, a part of the talking machine being on one side of the partition in one compartment, the record support and reproducer being on the other side of the partition in the other compartment, a sound conveyer communicating with the reproducer, said sound conveyer passing through and fitting snugly the opening in the partition and its outer end registering with the opening in the cabinet, and means permitting movement of the reproducer in its compartment.

36. In combination, a cabinet having a movable closure, a sound reproducing machine including a sound box and connections, a stationary horn communicating with the sound box connections and extending beyond the closure, the sound box and the connections being entirely inclosed within the closure.

37. In a talking machine, the combination with sound reproducing means, of a cooperating sectional sound-directing amplifier connected therewith, a divided cabinet inclosing the talking machine and one of the sections of the amplifier above the talking machine and inclosing and supporting the other section of the amplifier below the talking machine.

38. In a talking machine, the combination with a record and sound reproducing means, of a cooperating amplifier connected therewith, an inclosure supporting the major portion of the amplifier, a compartment inclosing the operating mechanism of the talking machine to isolate the sound produced thereby from that issuing from the amplifier, and a cover inclosing the reproducer stylus and record to isolate the sound produced by their contact from that issuing from the amplifier.

39. A sound reproducing machine comprising a cabinet divided into two acoustically non-communicating compartments separated by a partition, a sound reproducer in one of said compartments, a sound amplifier

in the other of said compartments and communicating through said partition with said reproducer.

40. A sound reproducing machine comprising a cabinet, a partition provided with an opening and separating said cabinet into two acoustically non-communicating compartments, a reproducer inclosed in one of said compartments, a sound amplifier in the other of said compartments, and a sound conveyer fitting said opening in said partition and communicating with said reproducer and said amplifier.

41. A sound reproducing machine comprising a cabinet, a partition provided with an opening and separating said cabinet into two acoustically non-communicating compartments, a reproducer in one of said compartments, a sound amplifier in the other compartment, a sound conveyer fitting said opening in said partition and communicating with said reproducer and said amplifier, said latter compartment being provided with a sound exit opening and said amplifier having its sound exit end fitting about said opening.

42. In a talking machine, the combination with a cabinet formed in its bottom with an opening, a talking machine including a reproducer, the reproducer being separated from the body of the cabinet, a horn extending downwardly in the cabinet to direct the sound downwardly through the opening in the bottom of said cabinet, and a sound conveyer communicating with the horn and the reproducer.

43. In a talking machine, a casing having an opening, sound amplifying means stationary mounted within said casing and inclosed thereby, the large end of said amplifying means terminating at about said opening in the casing, a sound conveying tube mounted upon said casing and having one end connected with the small end of said amplifying means, sound reproducing means at the other end of said sound conveying tube and a record support mounted upon said casing.

44. In a talking machine, the combination with sound reproducing means, of a cooperating amplifier connected with the reproducing means, and means for preventing extraneous vibration of the amplifier.

45. In a talking machine, the combination with sound reproducing means, of an amplifier cooperatively connected therewith, means for preventing extraneous vibration of the amplifier, and means for isolating extraneous sound from that issuing from the amplifier.

46. In a talking machine, the combination with sound reproducing means, of a cooperating resonating amplifier connected therewith, means for preventing extraneous vibration of the amplifier, and means for modifying and deflecting the sound operating upon the sound waves after they have passed through the amplifier.

47. A casing having means dividing the same into compartments, reproducing mechanism supported within one of said compartments, a sound amplifier in the other of said compartments, said reproducing mechanism and amplifier communicating through the said means, and said amplifier communicating with the outside of said casing.

48. In a talking machine, sound reproducing means, stationarily mounted sound amplifying means, a movable sound conductor connecting the said sound reproducing and sound amplifying means, and a casing inclosing said amplifying means for preventing extraneous vibration of the latter.

49. In a talking machine, sound reproducing means, sound resonating means, a movable sound conductor connecting the said sound reproducing and sound resonating means, and a casing inclosing said resonating means for preventing extraneous vibration of the latter.

50. In a talking machine, sound reproducing means, stationarily mounted sound amplifying and resonating means, a movable sound conductor connecting said sound reproducing means and said amplifying and resonating means, and a casing inclosing said amplifying and resonating means for preventing extraneous vibration thereof.

51. In a talking machine, sound reproducing means, stationarily mounted sound amplifying means, a movable sound conductor connecting said sound reproducing and sound amplifying means and a casing inclosing said amplifying means for preventing extraneous vibration thereof and providing an air space around said amplifying means.

52. In a talking machine, sound reproducing means, combined amplifying and resonating means, a movable sound conductor connecting said sound reproducing means and said amplifying and resonating means, and a casing inclosing said resonating and amplifying means for preventing extraneous vibration thereof.

53. In a talking machine, sound reproducing means, stationarily mounted amplifying means, a movable sound conductor connecting said sound reproducing and sound amplifying means, and a casing inclosing said amplifying means for preventing extraneous vibration thereof, and providing an air space around said amplifying means communicating with the outside atmosphere.

54. In a talking machine, sound reproducing means, stationarily mounted sound amplifying means, a movable sound conductor connecting said sound reproducing and sound amplifying means, and a casing inclosing the major portion of said amplifying means for preventing extraneous vibration thereof.

55. In a talking machine, a casing having an opening, sound amplifying means stationarily mounted within said casing and

inclosed thereby, the large end of said amplifying means terminating at about said opening in the casing, a sound conveying tube carried by said casing and having one end connected with the small end of said amplifying means, sound reproducing means at the other end of said sound conveying tube, and a record support carried by said casing.

56. In a talking machine, non-communicating casings, sound reproducing means inclosed within one of said casings, sound amplifying means inclosed within the other of said casings, said sound reproducing and sound amplifying means being connected by a sound conductor extending through the partition between said casings.

57. In a talking machine, non-communicating casings, sound reproducing means inclosed within one of said casings, sound amplifying means inclosed within the other of said casings, said sound reproducing and sound amplifying means being connected by a sound conductor extending through the partition between said casings, and a movable closure for the mouth of said amplifying means.

58. In a talking machine, non-communicating casings, sound reproducing means inclosed within one of said casings, sound amplifying means inclosed within the other of said casings, said sound reproducing and sound amplifying means being connected by a sound conductor extending through the partition between said casings, and a movable closure for the casing containing the sound reproducing means.

59. In a talking machine, non-communicating casings, sound reproducing means inclosed within one of said casings, sound amplifying means inclosed within the other of said casings, said sound reproducing and sound amplifying means being connected by a sound conductor extending through the partition between said casings, the casing around said amplifying means providing an air space surrounding the latter.

60. In a talking machine, non-communicating casings, sound reproducing means inclosed within one of said casings, sound amplifying and resonating means inclosed within the other of said casings, said sound reproducing and sound amplifying and resonating means being connected by a sound conductor extending through the partition between said casings.

61. In a talking machine, sound reproducing means, stationarily mounted amplifying means connected therewith, a casing separate from but inclosing said amplifying means, and means for deflecting the sound after amplification.

62. In a talking machine, sound reproducing means, stationarily mounted amplifying means connected therewith, a casing separate from but inclosing said amplifying means,

and means for modifying the sound after amplification.

63. In a talking machine, sound reproducing means, stationarily mounted amplifying means connected therewith, a casing separate from but inclosing said amplifying means, and means for deflecting and modifying the sound after amplification.

64. In a talking machine, a casing having an opening, stationarily mounted amplifying means inclosed in said casing, the large end of said amplifying means being situated at about said opening in the casing, an adjustable closure for the opening in said casing, and sound reproducing means carried by said casing and connected with said amplifying means.

65. In a talking machine, non-communicating casings, sound reproducing means inclosed within said casings, sound amplifying means being inclosed in the other of said casings and connected with said sound reproducing means through the partition between said casing, and a movable closure for the casing within which said sound reproducing means are situated.

66. In a talking machine, non-communicating casings, sound reproducing means situated within one of said casings, sound amplifying means situated in the other of said casings and connected with said sound reproducing means, and movable closures for each of said casings.

67. In a talking machine, sound reproducing means, a record support, stationarily mounted amplifying means connected with said sound reproducing means, a casing inclosing said amplifying means for preventing extraneous vibration thereof, a motor for said record support and a casing inclosing said motor.

68. In a talking machine, the combination with sound reproducing means, of a cooperating stationary amplifier connected with the reproducing means, and means for preventing extraneous vibration of the amplifier.

69. In a talking machine, the combination with sound reproducing means, of a cooperating stationary amplifier flexibly connected with the reproducing means, and means for preventing extraneous vibration of the amplifier.

70. In a talking machine, the combination with a record, of a reproducer, means for producing a relative movement of said record and reproducer whereby sound is reproduced, an amplifier connected with the reproducer, and means for preventing extraneous vibration of the amplifier.

71. In a talking machine, the combination with a record, of a reproducer, means for producing a relative movement of said record and reproducer whereby sound is reproduced, a stationary amplifier connected with the re-

producer, and means for preventing extraneous vibration of the amplifier.

72. In a talking machine, the combination with a record, of a reproducer, means for producing a relative movement of said record and reproducer whereby sound is reproduced, a stationary amplifier connected with the reproducer, and an inclosure for preventing extraneous vibration of the amplifier and rigidly supporting the major portion of the amplifier.

73. In a talking machine, the combination with a record, of a reproducer, means for producing a relative movement of said record and reproducer whereby sound is reproduced, a stationary amplifier connected with the reproducer and shaped to cause the travel of the sound-waves to deviate from a straight line, and means for preventing extraneous vibration of the amplifier.

74. In a talking machine, the combination with a record, of a reproducer, means for producing a relative movement of said record and reproducer whereby sound is reproduced, a stationary amplifier connected with the reproducer and shaped to cause the travel of the sound-waves to deviate from a straight line, and an inclosure supporting the major portion of the amplifier for preventing extraneous vibration of said amplifier.

75. In a talking machine, the combination with a record operating in a fixed position, of a cooperating traveling reproducer, an amplifier connected with the reproducer, and means for preventing extraneous vibration of the amplifier.

76. In a talking machine, the combination with a record operating in a fixed position, of a cooperating traveling reproducer, an amplifier connected with the reproducer, and an inclosure supporting the major portion of the amplifier in a fixed position and for preventing extraneous vibration thereof.

77. In a talking machine, the combination with a record, of a cooperating traveling reproducer the motion of which is controlled by the record, a stationary amplifier connected with the reproducer, and means for preventing extraneous vibration of the amplifier.

78. In a talking machine, the combination with a record, of a cooperating traveling reproducer the motion of which is controlled by the record, a stationary amplifier connected with the reproducer, and an inclosure embracing the major portion of the amplifier for preventing extraneous vibration thereof.

79. In a talking machine, the combination with a record, of a cooperating traveling reproducer, a stationary amplifier flexibly connected with the reproducer, and means for preventing extraneous vibration of the amplifier.

80. In a talking machine, the combination

with a record operating in a fixed position, of a cooperating traveling reproducer, an amplifier connected with the reproducer and shaped to cause the travel of the sound-waves to deviate from a straight line, and means for preventing extraneous vibration of the amplifier.

81. In a talking machine, the combination with a record operating in a fixed position, of a cooperating traveling reproducer, an amplifier connected with the reproducer and shaped to cause the travel of the sound-waves to deviate from a straight line, and an inclosure supporting the major portion of the amplifier in a fixed position for preventing extraneous vibration thereof.

82. In a talking machine, the combination with a record, of a cooperating reproducer, an amplifier connected with the reproducer and located below the record, and means for preventing extraneous vibration of the amplifier.

83. In a talking machine, the combination with a record operated in a fixed position, of a cooperating traveling reproducer, an amplifier connected with the reproducer and located below the record, and means for preventing extraneous vibration of the amplifier.

84. In a talking machine, the combination with a record operating in a fixed position, of a cooperating traveling reproducer located above said record, an amplifier located below said record and connected with the reproducer, and an inclosure supporting the major portion of said amplifier below said record.

85. In a talking machine, the combination with sound reproducing means, of an amplifier cooperatively connected therewith, and means for supporting the major portion of the amplifier and preventing extraneous vibration of the same.

86. In a talking machine, the combination with sound reproducing means, of an amplifier cooperatively connected therewith, and an inclosure below the talking machine within which is positioned the major portion of the amplifier.

87. In a talking machine, the combination with sound reproducing means, of a cooperating amplifier connected therewith, and an inclosure supporting the major portion of the amplifier below the talking machine.

88. In a talking machine, the combination with sound reproducing means, of a cooperating amplifier connected therewith, and an inclosure supporting the major portion of the amplifier in a fixed position below the talking machine.

89. In a talking machine, the combination with sound reproducing means, of a stationary amplifier cooperatively connected therewith, a compartment completely inclosing the talking machine operating mechanism,

and means for preventing extraneous vibration of the amplifier.

90. In a talking machine, the combination with sound reproducing means, of a stationary amplifier cooperatively connected therewith, a compartment completely inclosing the talking machine operating mechanism, and a non-communicating inclosure embracing the major portion of the amplifier.

91. In a talking machine, the combination with sound reproducing means, of a cooperating amplifier connected therewith, a compartment completely inclosing the talking machine operating mechanism, and a non-communicating inclosure supporting the major portion of the amplifier in a fixed position.

92. In a talking machine, the combination with sound reproducing means, of a sectional sound-directing amplifier cooperatively connected therewith, and means for preventing extraneous vibration of the major section of the amplifier.

93. In a talking machine, the combination with sound reproducing means, of a cooperating sectional sound-directing amplifier connected therewith, and an inclosure supporting the major section of the amplifier below the talking machine.

94. In a talking machine, the combination with sound reproducing means, of a cooperating sectional sound-directing amplifier connected therewith, a compartment completely inclosing the talking machine operating mechanism, and a non-communicating inclosure supporting the major section of the amplifier in a fixed position.

95. In a talking machine, the combination with sound reproducing means, of a cooperating sectional jointed sound-directing amplifier connected therewith, a divided cabinet inclosing the talking machine and one of the sections of the amplifier above the talking machine and inclosing and supporting the other section of the amplifier in a fixed position below the talking machine.

96. In a talking machine, the combination with sound reproducing means, of an amplifier cooperatively connected therewith, an inclosure embracing the major portion of the amplifier, and additional means for isolating extraneous sound from that issuing from the amplifier.

97. In a talking machine, the combination with sound reproducing means, of a cooperating amplifier connected therewith, an inclosure supporting the major portion of the amplifier, and additional means for isolating extraneous sound from that issuing from the amplifier.

98. In a talking machine, the combination with sound reproducing means, of a cooperating amplifier connected therewith, means for supporting the major portion of the am-

plifier and preventing extraneous vibration of the same, and a compartment inclosing the operating mechanism of the talking machine to isolate the sound produced thereby from that issuing from the amplifier.

99. In a talking machine, the combination with sound reproducing means, of a cooperating amplifier connected therewith, an inclosure supporting the major portion of the amplifier, a compartment inclosing the operating mechanism of the talking machine to isolate the sound produced thereby from that issuing from the amplifier, and means for isolating the sound produced by the contact of the reproducer stylus with the record from that issuing from the amplifier.

100. In a talking machine, the combination with sound reproducing means, of a cooperating resonating amplifier connected therewith, an inclosure supporting the major portion of the amplifier in a fixed position and providing an air space around the same, and means for modifying and deflecting the sound operating upon the sound-waves after they have passed through the amplifier.

101. A talking machine, comprising a main casing, an adjustable closure for said casing, a sound reproducer within said main casing, a motor casing containing the talking machine operating means, and a sound conveyer extending from said reproducer toward said closure, the said motor casing separating said operating means from said sound conveyer.

102. A sound reproducing machine, comprising a main inclosing cabinet, a sound reproducer within said cabinet, a motor compartment for the talking machine operating means, an amplifying horn, an adjustable closure for said main cabinet in front of the mouth of said horn, and a sound conveying tube connecting said reproducer with said horn.

103. A sound reproducing machine, comprising a main casing, an adjustable closure for said casing, a sound reproducer within said casing, a motor casing containing the

talking machine operating means, and a sound conveyer extending from said reproducer toward said closure and beneath said operating means.

104. A sound reproducing machine comprising a sound reproducer inclosed within a main casing, an inner motor casing, an amplifying horn beneath said casing, a sound conveyer connecting said reproducer with said amplifying horn, an adjustable closure in the front of the main casing and in front of the mouth of said horn.

105. A casing having a partition forming compartments, reproducing mechanism supported within one of said compartments, a stationary sound amplifier in the other of said compartments, said reproducing mechanism and amplifier communicating through the partition between said compartments, and said amplifier communicating with the outside of the casing.

106. In a talking machine, a casing having an opening, sound amplifying means stationarily mounted within said casing and inclosed thereby, the large end of said amplifying means terminating at about said opening in the casing, a sound conveying tube within said casing and having one end connected with the small end of said amplifying means, sound reproducing means at the other end of said sound conveying tube, and a record support within said casing.

107. In a talking machine, sound reproducing means, sound resonating means, a movable sound conductor connecting the said sound reproducing and sound resonating means, and a casing separate from the resonator but inclosing the same and shutting off extraneous sounds from the talking machine to said resonator.

In testimony whereof I affix my signature in the presence of two witnesses.

HENRY C. MILLER.

Witnesses:

WM. F. PALMER.

JNO. IMIRIE.



L. T. HAILE.

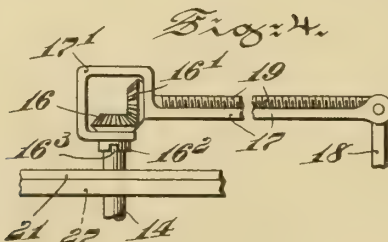
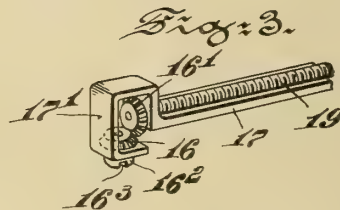
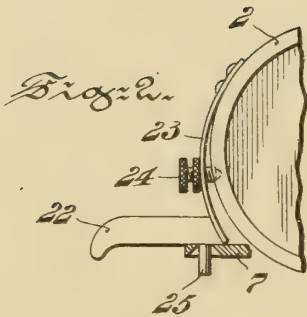
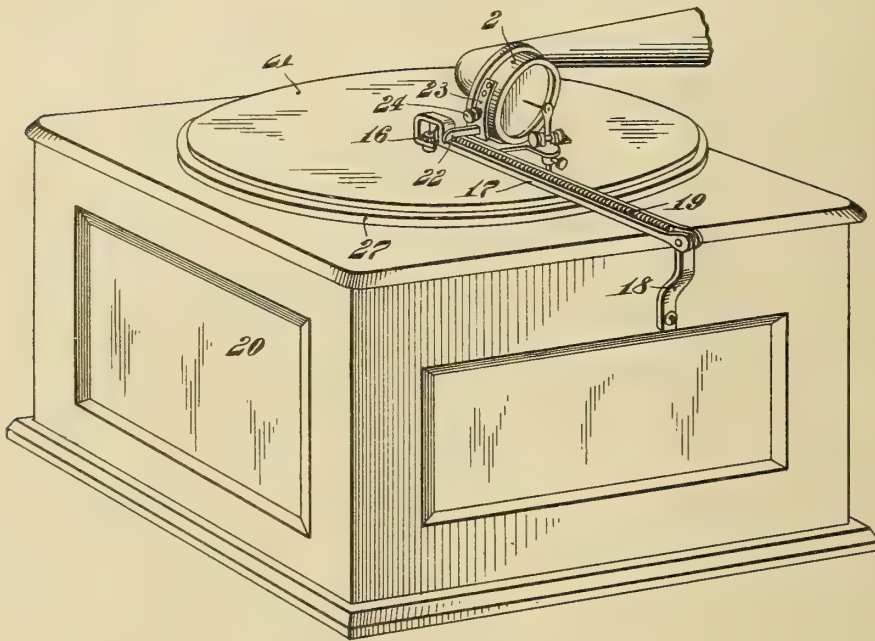
GRAMOPHONE.

APPLICATION FILED FEB. 21, 1907.

923,119.

Patented May 25, 1909.

Fig: 1.



WITNESSES:

Jas C. Hobbsmith
Oda M. Childs

INVENTOR

Luther T. Haile

BY

H. V. Hutton

ATTORNEY.

UNITED STATES PATENT OFFICE.

LUTHER T. HAILE, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, OF ONE-FIFTH TO MAURICE N. WEYL AND WILLIAM A. MACKIE, ONE-FIFTH TO JOSEPH W. SHANNON, ONE-TWENTIETH TO FREDERICK J. GEIGER, AND ONE-TWENTIETH TO LOGAN W. MULFORD, ALL OF PHILADELPHIA, PENNSYLVANIA.

GRAMOPHONE.

No. 923,119.

Specification of Letters Patent.

Patented May 25, 1909.

Original application filed July 6, 1906, Serial No. 324,978. Divided and this application filed February 21, 1907. Serial No. 358,662.

To all whom it may concern:

Be it known that I, LUTHER T. HAILE, a citizen of the United States, residing in the city of Philadelphia, State of Pennsylvania, have invented certain new and useful Improvements in Gramophones, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention in sound-reproducing machines of this class relates to means for operatively supporting and propelling the sound-box mechanism relatively to the traveling record, in order that the latter shall no longer perform the function of propelling the sound-box mechanism as commonly done in known machines of this character.

My invention also relates to means, in such machines, for readily bringing the actuating shafts into and out of operative register, to more readily remove and replace a record tablet.

The primary object of the first part of the invention is as stated above, but its minor objects and the incidental advantages flowing from its principle of construction and operation are three-fold; namely, it permits both vertical and lateral play of the directly-actuating connection between the threaded shaft and sound-box mechanism, due to inequalities in the record, automatically adjusting itself, in relation to the sound-box mechanism, hence compensating for the arc-like movements of the latter over the record; it responds and adjusts itself automatically to abnormal movements of the stylus or needle over the record due to inaccuracies in the sound-grooves on the face of the record tablet; and finally regulates and controls the depth of engagement of the needle with the record.

My present invention about to be described is a division of my former and pending application Ser. No. 324,978 filed July 6, 1906 for Letters Patent, and it consists of the mechanism hereinafter set forth, to accomplish the objects above recited; the distinctively novel features being pointed out in the appended claims.

In the drawings illustrating my invention: Figure 1 is an elevation, in perspective,

of the exterior of a talking-machine cabinet, showing the sound-box mechanism, the means for operatively supporting and propelling it over the record, the threaded actuating shaft therefor and its pivoted connection with the cabinet. Figs. 2 and 3 are respectively plan and side elevations of the propelling mechanism and the actuating threaded shaft; and Fig. 4 is an elevation, partly broken away, of the novel means for operatively connecting the pivoted actuating mechanism with the main shaft and with the sound-box and adjunctive parts, to swing them into and out of operative register.

I will now describe my invention, by reference to the drawing. In Fig. 1 is shown in perspective the exterior of the cabinet of the machine, and the usual sound-box mechanism comprising the diaphragm holder 2. These parts must, as usual, be supported and propelled over the revoluble record tablet 21, which is a centrally apertured annular plate mounted by such aperture, upon the projecting end of the vertically disposed main shaft 14, and resting upon a supporting plate 27 also carried by such shaft 14 which is rotated by spring mechanism or any other suitable motor, as usual, and therefore not shown nor necessary to be described. The upper end of the main shaft 14 is provided with an actuating head in the form of a transversely-disposed rib adapted to register with the correspondingly slotted end of a connecting shaft as hereinafter described, whereby the threaded shaft 19 which directly actuates the sound-mechanism and its adjunctive parts may be operatively connected and disconnected. See Figs. 1 and 4. This is effected by constructing the housing frame for the said threaded shaft, with a channeled arm 17 to operatively support the shaft 19 and with an open ended frame 17' to support a bevel gear 16' fast on the end of the threaded shaft, and another and meshing gear 16 on the end of a short shaft 16' having a slotted end 16' adapted to engage the suitably ribbed head end of the main shaft when brought into register therewith as aforesaid. The rearward end of the housing 17, 17', is hinged to the upper end of a fixed bracket 18 on the side wall of the cabinet. The result

of this construction is that the threaded-shaft and its bevel gearing is pivotally supported over the tablet record and over the actuating head end of the main shaft, and
 5 can be swung up and down (the sound-box mechanism being first removed as usual) to permit ready removal and replacement of a tablet record 21 on the supporting-plate 27 rotated by such main shaft.

10 The other equally if not more important part of the invention, I will now describe. In machines of this class as now known, the sound-box mechanism is not only supported by the traveling tablet record but is propelled
 15 thereby. I avoid the many known objections to that method and means of propulsion, by the following method and means which relieve the record tablet from the performance of that function.

20 As before stated, the actuating threaded shaft 19 is operatively supported in a plane parallel with the plane of the revolving tablet record, the sound grooves in which are usually spiral, from center to circumference,
 25 and the sound-box mechanism has a motion in like direction, which is a movement from center to rim of the tablet and which is parallel with the threaded shaft save as modified by the slightly arc-like swaying move-
 30 ment of the sound-box, as the needle abuts with the side walls of the sound-grooves in the tablet, for it is the side walls thereof and not the bottom wall of the groove which give sound-producing vibratory movements to
 35 the needle. The spur arm 22 (see Figs. 1 and 4) projects outwardly some little distance from the sound-box mechanism and must be operatively supported transversely to the length of the actuating shaft 19, the hook
 40 end of the spur arm engaging the threads of the rotating shaft 19, passing from thread to thread thereof as the sound-box mechanism travels from center to rim of the revolving tablet. To support and properly maintain
 45 this spur arm in operative engagement with the threaded shaft, I provide an actuating arm 23, which is mounted dependently on the frame 2 of the diaphragm holder, being fast by one end thereon, with the lower end
 50 free and bearing against the inner and inclined end of the said spur arm. The actuating arm 23 is shown as a spring arm, because it must have resiliency and exert outwardly bearing pressure against the inner
 55 and inclined end of the spur arm, but it must have an adjustably controlled pressure, hence I apply thereto the tension screw 24, see Fig. 4.

To permit a slight rise and fall of the spur
 60 arm near its inner or shank end, and also a slight lateral or swinging movement thereof, a supporting device is provided therefor which also operates to guidingly permit vertical lateral play as aforesaid; and to this
 65 end the underface of the spur arm is pro-

vided with a pin 25 which plays in a cone-shaped hole in the guide-plate 7 which projects from the diaphragm holder to which it is secured and which, as shown in the drawings, may be an extension of the same plate
 70 which, as, in known constructions, operates as the guide-plate for the needle-arm. This construction controls both the lateral and vertical movements of the spur arm and of its adjunctive parts, and provides means, in
 75 combination with the other elements described, in substitution for the record itself, to propel the sound-producing mechanism over the record.

The lower end or hook of the spur arm 22
 80 is made sufficiently thin to engage with the threads on the shaft 19. The sound-box being placed in position for playing, the spur 22, properly adjusted, prevents the weight of the sound-box and its appurtenant parts
 85 from pressing too heavily on the record, thus avoiding any scraping of the moving needle on the surface of the record.

Having thus described my invention, I claim as new and desire to secure by Letters
 90 Patent:—

1. In an instrument of the class recited, means to propel the sound-box mechanism over the record, comprising the combination
 95 with the frame of the diaphragm holder, of a spring arm mounted by one end thereon, means to create a tension on the free end of said spring arm, a spur arm with which the free end of said spring arm operatively en-
 100 gages, and a threaded rotatable shaft operatively engaging the spur arm.

2. In an instrument of the class recited, the combination with the sound-box mechanism, of means to propel the same over the record, consisting of a threaded rotatable
 105 shaft, a spur arm operatively engaging the threads of said shaft, and a resilient tensioned arm mounted on the diaphragm-holder and operating as well to maintain the spur arm in operative engagement with the
 110 threaded shaft as to permit vertical and lateral movements of the spur arm and adjunctive parts due to inequalities in the record.

3. In an instrument of the class recited,
 115 means operating as well to propel the sound-box mechanism over the record, as to regulate the depth of engagement of the needle with the record, comprising the combination with the frame of the diaphragm holder, of a
 120 resilient actuating arm mounted thereon, means to create and regulate tensional force in the free end thereof, a spur arm with which the free end of said actuating arm en-
 125 gages, a threaded actuating shaft the threads of which operatively engage the other end of said spur arm, with means to guidingly support the spur arm and permit vertical and lateral play thereof in response to abnormal
 130 movements of the needle over the record.

4. In an instrument of the class recited, comprising sound-box mechanism, of means to propel the same over the record, combined with means to compensate for the arc-like movements thereof in its propulsion over the record, said means comprising a threaded rotatable shaft mounted in a plane parallel with that of the revoluble record, a spur arm with which said shaft operatively engages, said spur arm projecting in a horizontal plane transversely to that of the threaded actuating shaft, a pin on the underface of the spur arm, an apertured bar carried by the sound-box mechanism and operating to guidingly support said spur arm, and a spring-arm dependingly mounted by one end on the diaphragm holder with its free end engaging the rearward end of said spur arm and operating automatically to maintain it under varying coincidence in engagement with the threaded rotatable shaft.

5. In an instrument of the class recited, comprising a cabinet containing interiorly a vertical main shaft on the projecting end of which a record tablet may be operatively mounted, the free upper end of such shaft having a connecting actuating head, in combination with sound-box mechanism operatively supported over the same by the following instrumentalities, namely, a bracket fixedly mounted on the exterior of the cabinet, a housing frame pivotally mounted at one end on said bracket, a screw-threaded rotatable shaft operatively supported in said housing frame, a pair of bevel gears actuating the said shaft, the lower of said gears carrying a shaft having a slotted end adapted to operatively engage the head end of said main

shaft when said parts are brought into register.

6. In an instrument of the class recited, comprising a cabinet containing a main shaft, with means to rotate it, a record tablet rotatably carried by said shaft, a transversely-arranged screw-threaded shaft carrying bevel gearing operatively engaging the main shaft, a housing frame in which said threaded shaft is operatively supported on the cabinet, in combination with sound-box mechanism comprising a diaphragm holder with a depending spring arm, a spur arm the one end of which engages said threaded shaft and the other end of which is in engagement with said depending spring arm on the diaphragm holder, and means to guidingly support the spur arm in its engagement with said threaded shaft.

7. A talking machine comprising a disk record carrier, an axial actuating shaft therefor projecting above said carrier, a bracket, a feed shaft disposed radially of said record carrier, a support for said shaft hinged to said bracket, a bevel gear on the free end of said feed shaft, a bevel gear meshing with said feed shaft gear, and means operatively connecting the said gears with the upper end of said axial actuating shaft for the disk record carrier.

In testimony whereof, I have hereunto affixed my signature this sixteenth day of February, A. D. 1907.

LUTHER T. HAILE.

Witnesses:

ADA M. BIDDLE,

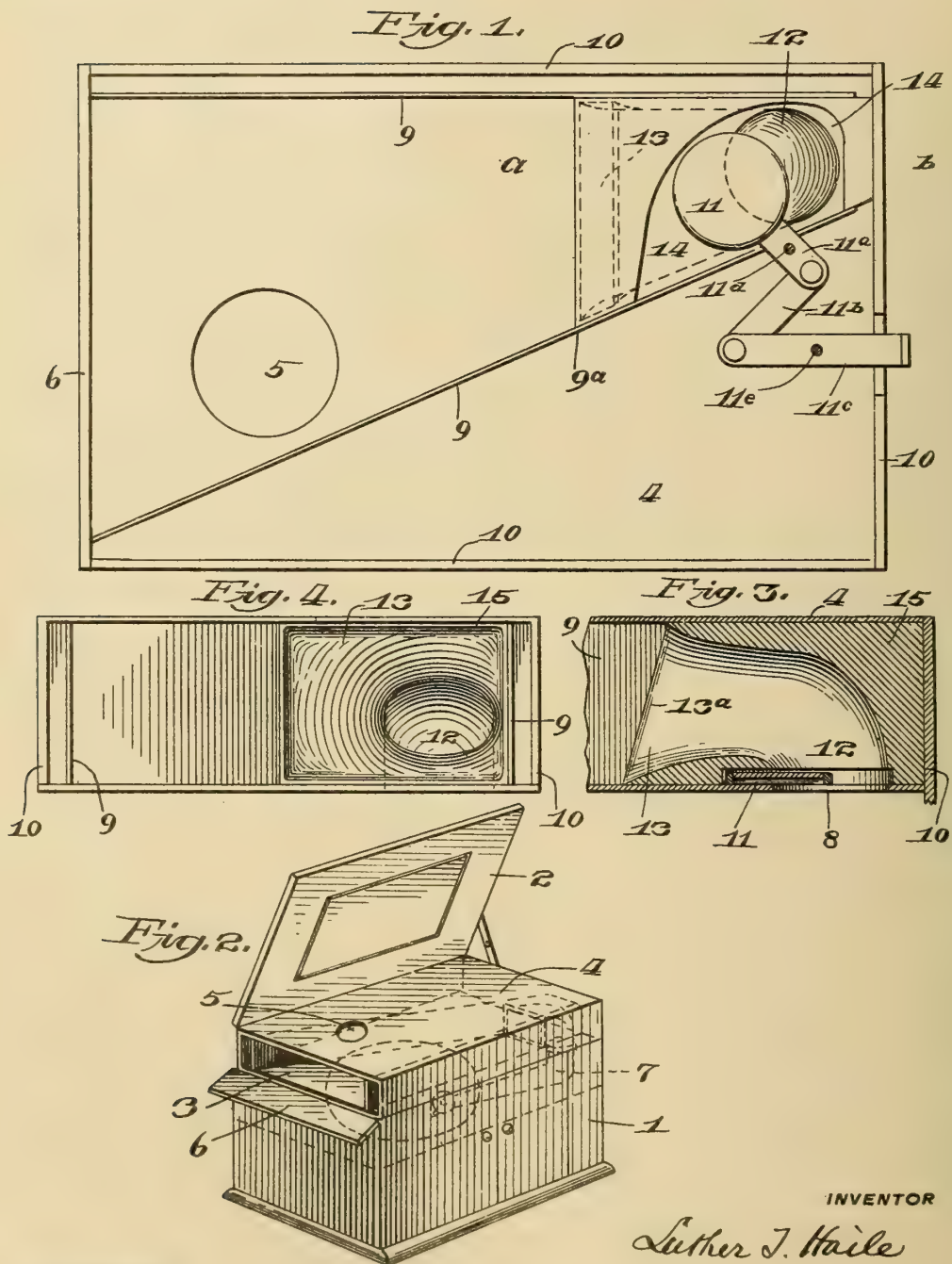
JAS. C. WOBENSMITH.



L. T. HAILE.
SOUND REPRODUCING MACHINE.
APPLICATION FILED JAN. 29, 1909.

924,456.

Patented June 8, 1909.



WITNESSES
J. J. Samble
A. M. Ciddle

BY

INVENTOR
Luther J. Haile
H. S. Henton
ATTORNEY

UNITED STATES PATENT OFFICE.

LUTHER T. HAILE, OF PHILADELPHIA, PENNSYLVANIA.

SOUND-REPRODUCING MACHINE.

No. 924,456.

Specification of Letters Patent.

Patented June 8, 1909.

Application filed January 29, 1909. Serial No. 474,898.

To all whom it may concern:

Be it known that I, LUTHER T. HAILE, a citizen of the United States, and resident of Philadelphia, State of Pennsylvania, have invented certain new and useful Improvements in Sound-Reproducing Machines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention has for its object the provision of means, applicable to sound-reproducing machines, for governing and directing the course of sound-waves from the tone-arm to the sound-discharge chamber, as well as to provide a covered seat for a tone-modifying valve between said elements, and I will explain its construction and mode of operation as applied specifically to the sound-reproducing machine described in and patented to me by U. S. Letters Patent No. 873,937 dated December 17, 1907, in combination with the resonance-chamber of which, it has its greatest utility. In said machine the sound waves produced by the vibrating diaphragm of the sound-box carried by the movable tone-arm are delivered into a resonance-chamber having a sounding-board wall or walls which are thereby sympathetically vibrated. Diverging partition walls are mounted in such resonance-chamber, leading from the sound-inlet aperture therein and toward the sound-discharge openings, and such inlet aperture is governed by a movable valve. To prevent an abrupt amplification of such sound-waves as they pass the valve into the large resonance-chamber, to direct their course, to cause them to impinge against the vibratable partition walls of such chamber and against the sounding-board wall thereof, I have found from practical tests that my present invention effects the result stated and enlarges the vibratory effect, besides enabling the valve to operate more perfectly as a tone-modifying agent.

To these ends my present invention hereinafter described and claimed consists of the novel member, which I shall call a valve block and sound-wave conductor, interposed between the tone-arm and the sound-discharge element of a talking machine, and having interior ports and passage adapted to provide a covered or inclosed seat for the upper face of a tone-modifying valve, and to receive in its interior passageway above

the valve-seat the sound-waves delivered to it past such valve and properly direct their course as aforesaid.

In the accompanying drawings illustrating my invention, Figure 1 is a bottom view of the new element, shown in place on the resonance-chamber of my former machine, the base wall thereof being removed; the dotted line indicating the shape of the interior passageway above the valve-seat. Fig. 2 is a perspective, in dotted lines, of the same elements in top view, and indicating their relation to the tone-arm and connected parts. Fig. 3 is a section on the line *a-b* of Fig. 1, and Fig. 4 is an end view of the resonance-chamber, its partition walls, and the valve block, shown in reversed position in Fig. 1.

Referring now to said drawings, 1 indicates a containing cabinet, with hinged lid 2, the cabinet containing at top, below the lid, a resonance-chamber 3, of which the top wall 4 is a sounding board, having the usual sound-aperture 5 therein, and preferably supplied with a hinged closure piece 6. In the body of the cabinet 1 is contained talking machine apparatus, of any usual kind, the drawing indicating, in dotted lines, a disk form of such machine, having a tone-arm 7, the discharge end of which is operatively connected by a suitable swivel bearing, with the inlet aperture 8 in the bottom or base-wall of the resonance-chamber 3. Vertically-disposed partition walls 9, which diverge outwardly, are mounted within the resonance-chamber, proceeding from the region of and surrounding the inlet aperture therein and extending in the opposite direction. All these parts are shown and described in my former patent and need not be further described herein.

The new element added thereto, as shown in end view in Fig. 4 and in vertical section, taken longitudinally, in Fig. 3, both views showing it in place on the resonance-chamber of the machine, is a member 10, shown as a block of wood, that material being preferred because it is more suitably vibratable; and this member is recessed at 11 (as seen in Fig. 1) to form an inclosed chamber for the movable valve 11 which is freely movable therein, and preferably without contact with the walls of said recess. Proceeding thence from the top of this recess 11, the block 10 is hollowed out to form a curved passageway

12, 13, for sound waves, said passageway beginning at the top wall of said recess 14, in circular form as at 12 (Figs. 3 and 4) thence curving and at same time gradually enlarging in cross-sectional area, passing from circular to rectangular in cross section (see 13 Fig. 4) at its outlet, and terminating thereat in a peripheral edge which is preferably inclined from the vertical, as indicated at 13^a in Fig. 3. In assembling the elements, said new member 15 is placed, relatively to the basal wall 11 of the resonance-chamber 3, to bring the recessed valve-inclosing chamber 14 over the aperture 8 in said basal wall, and also to bring the inlet end 12 of the passageway on the member 15 in vertical alinement with said aperture 8 in the basal wall of the resonance-chamber. The valve 11 is interposed between the two by being placed in said recess 14 and mounted to be actuated therein by means of a jointed handle 11^a 11^b and 11^c pivoted at 11^a and 11^c to the base wall 11, the part 11^b extending outside the vertical wall 10 of the resonance-chamber, as more particularly shown and described in another U. S. patent granted to me No. 888,084 dated May 19, 1908. But this character of valve and means to actuate it may be varied in the construction and operation of the particular improvement described and claimed herein, for example as in my other U. S. Patent No. 873,937 before referred to. So mounting the new member 15 in the resonance-chamber, it is to be noted that it tapers externally in plan view, hence alining with the pair of diverging partition walls 9, 9, in the resonance-chamber, and inclosed between the rear ends of the same, as shown in Fig. 1, to which its side walls are preferably cemented, though it is not essential in such arrangement and combination with the new member 15 to extend the partition walls 9, 9, farther back than to form a junction with the valve block at about the point marked 9^a, in said Fig. 1, to form a junction between them.

In operation my improvement produces several advantageous results, in the combination described, notably, it prevents the abrupt amplification of sound-waves entering the resonance-chamber through the aperture in its basal wall, it provides an inclosed valve-seat for the valve, it causes a vibration of the valve-block itself and a transmission thereof by contact with and to the diverging partition walls which coincide with the exterior of the valve block member, and finally it gradually amplifies the sound-waves passing through its curved interior passage, discharging them against said partition walls and against the sounding-board wall of the resonance-chamber.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:—

1. In a sound-producing machine comprising a resonance-chamber one wall of which is a sounding board adapted to be sympathetically vibrated and another wall of which has an inlet port, a tone arm mounted to discharge sound-waves through said port from a reproducer, and means for preliminarily modifying and amplifying said sound-waves, consisting of a member having a curved interior passageway of gradually enlarging area, mounted within the chamber and communicating at its smaller end with said port and its larger end discharging said sound-waves directly into the interior of the chamber.

2. In a sound-producing machine comprising a resonance-chamber one wall of which is a sounding-board, a sound inlet port in another wall of said chamber, a tone arm mounted to discharge sound-waves through said port from a reproducer, of means constituting a sound-amplifying and tone-modifying passage, interposed between said port and the sounding-board wall of said chamber, said means consisting of a member inclosed within said resonance-chamber and having a curved interior passageway of gradually enlarging area the inlet end of which is circular and the discharge end of which is rectangular in cross-section.

3. In a sound producing machine comprising a sound-amplifying and tone-modifying chamber, and a tone-arm carrying a reproducer, of means comprising a valve interposed between said elements for directing the course and governing the transmission of sound-waves from one to the other, said means consisting of a member having a curved interior passageway, the said member being recessed surrounding its inlet port to provide an inclosing covering for said valve governing said port and passageway.

4. In a sound reproducing machine comprising a resonance-chamber the upper wall of which is a sounding board, diverging partition walls in said chamber, a sound inlet port in the basal wall of said chamber, and means to discharge sound waves through said port from a reproducer, of a member interposed between said port and the said partition walls, said member being of vibratable material and having a curved interior passageway of gradually enlarging area, the inlet end of which is circular in outline, and the discharge end of which is rectangular in outline.

5. In a sound-reproducing machine comprising a resonance-chamber, the upper wall of which is a sounding-board, a sound inlet port in the basal wall thereof, means to discharge sound-waves through said port from a reproducer, a valve governing said port, diverging partition walls in said chamber and a valve block fixedly mounted between said partition walls and over said

valved port, said valve block being recessed on its under face to provide an inclosure for said valve, and having a curved interior sound passage through it leading from said recess to and between said partition walls in the resonance-chamber.

In testimony whereof I have hereunto

affixed my signature this seventh day of January, A. D. 1909.

LUTHER T. HAILE.

Witnesses:

A. M. BIDDLE,

R. A. DUNLAP.



F. H. ANDREWS.
 PHONOGRAPH STOP.
 APPLICATION FILED OCT. 1, 1908.

924,527.

Patented June 8, 1909.

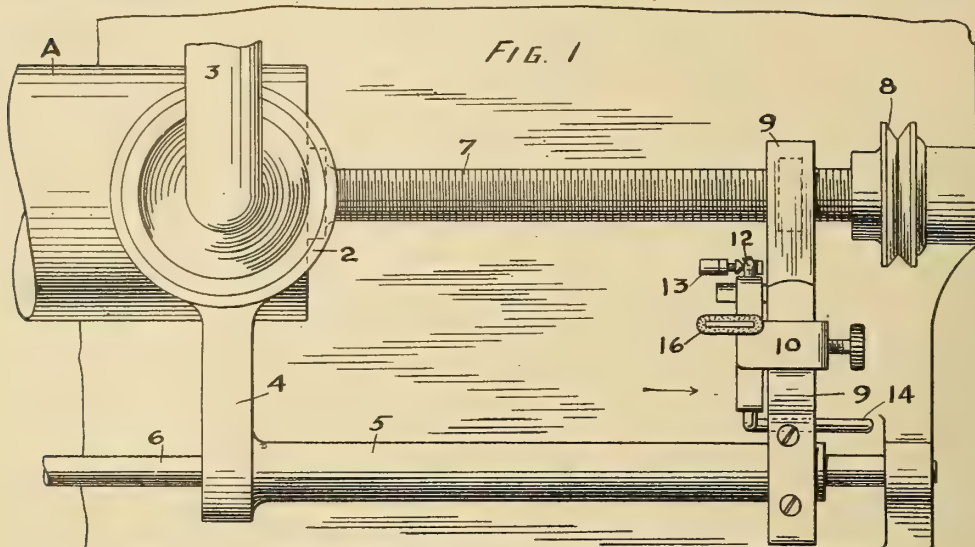


FIG. 2

FIG. 5

FIG. 4

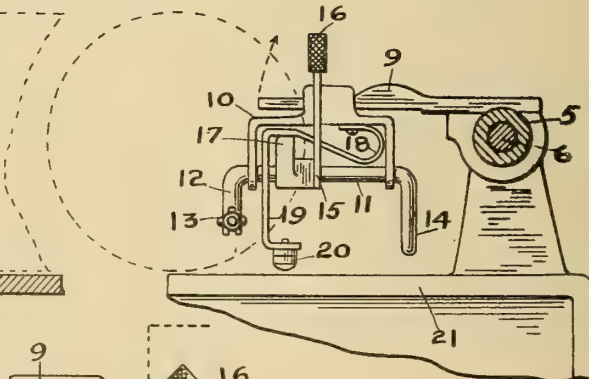
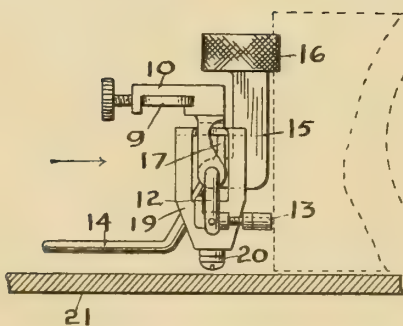
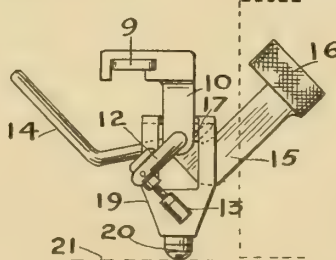


FIG. 3



WITNESSES

W. H. Puffer

Leon Brillot

INVENTOR

Frank H. Andrews

BY

Geo. H. Strong

ATTORNEY

UNITED STATES PATENT OFFICE.

FRANK H. ANDREWS, OF WATSONVILLE, CALIFORNIA.

PHONOGRAPH-STOP.

No. 924,527.

Specification of Letters Patent.

Patented June 8, 1909.

Application filed October 1, 1908. Serial No. 455,749.

To all whom it may concern:

Be it known that I, FRANK H. ANDREWS, citizen of the United States, residing at Watsonville, in the county of Santa Cruz and State of California, have invented new and useful Improvements in Phonograph-Stops, of which the following is a specification.

My invention relates to a stop device for phonographs, gramophones and like instruments, in which a revoluble record is employed, in conjunction with a sound-box and conducting apparatus.

It consists of the parts and the constructions and combinations of parts hereinafter described and claimed.

Referring to the accompanying drawings for a more complete explanation of my invention, Figure 1 is a plan. Fig. 2 is an end view of the device, in operative position. Fig. 3 shows the device after the stop is operated. Fig. 4 is a side elevation.

As shown in the present drawing my device is especially applicable to that class of phonographs or instruments, in which a cylindrical record is revolved with relation to a sound-box; and a horn or means for increasing the tone produced by the revolution of the record, in contact with the needle of the sound-box.

The record cylinder A is mounted to be revoluble without advancing upon a shaft, and the sound-box 2, having the horn 3 connected with it, is carried by an arm 4 upon a sleeve 5, which is adapted to slide upon a fixed shaft 6.

7 is a finely threaded screw-shaft having fixed to it a driving pulley 8 through which power may be applied to rotate the screw-shaft.

9 is a bar or plate having one end fixed to the sleeve 5 and the other end projecting above the screw-shaft, carries a half nut, or equivalent engaging device which, resting upon the screw shaft 7, will be caused to advance by the revolution of said shaft, and as it advances, it will move the sleeve 5 and the sound-box 2, with its transmitting needle, so that the needle will follow the record to its end. At this point, it is desirable to stop

further movement and arrest the parts. This is effected as follows: A yoke or holder 10 is fixed to the end of the bar 9, and in the down-turned ends of the yoke is journaled a turnable shaft 11, one of the arms 12 of which carries a projecting stud 13. The other arm 14 projects outwardly and forms

a handle by which to set the device, and also a stop to limit its movement when the latter automatically takes place. The shaft 11 has fixed to it an arm 15, the end of which projects upwardly, and carries a shoe 16. Connected also with the turnable shaft 11 is an upwardly projecting spur 17 which, when the device is set, acts against a spring 18 to hold it in a compressed position. This spring connects with an arm 19 which carries a shoe or stop 20 at its lower end, and when the device is set, this shoe is raised above the surface of the table 21 of the apparatus, over which it moves without contact.

The operation of the device will then be as follows: The apparatus being set in motion by connection of the pulley 8 with any suitable motor, the record cylinder A will be revolved, and by means of the screw-shaft 7, and the engagement therewith of the nut upon the arm 9, the sound-box 2 will be advanced as previously described. The stud 13 projects in such a manner that when the record is finished, this stud will strike the end of the record-carrying cylinder, and will thus turn the shaft 11 sufficiently to cause the stud 17 to release the spring 18. The spring then acting upon the stud 17, which is in an angular position with relation thereto, will cause a rotation of the shaft 11, which throws the brake shoe 16 forward against the end of the record cylinder A, thus stopping further rotation. At the same time, the shoe 20 will be depressed and caused to rest upon the table 21, and will thus arrest any further forward advance of the moving parts.

The arm 14 serves to set the apparatus whenever desired, by pressing it down; and when thus set, the device is in readiness for operation.

The contact point 13 is made adjustable lengthwise so that the stop may be minutely adjusted with relation to the other parts. This adjustment may be made by making the end of the stop 13 in the form of a sleeve which is advanced upon a screw-threaded bearing pin, or by other equivalent device.

Having thus described my invention, what I claim and desire to secure by Letters Patent is

1. The combination in a phonograph, of a revoluble record, a sound box, means for advancing the sound box with relation to the record, a brake shoe movable in unison with the sound box, and means by which said brake shoe is moved to arrest the forward

movement of the sound-box, said last-named means comprising a turnable shaft to which the brake shoe is fixed, and a member on said shaft adapted to be engaged by the record to
5 rock the shaft and thereby move the brake shoe into engagement with said record.

2. The combination in a phonograph and the like, of a revoluble record, a sound-box movable with relation to said record, a stop
10 movable in unison with the sound-box, means for moving said stop to arrest the movement of the sound-box when the record has been completed, said means comprising a rockable shaft to which the stop is fixed,
15 said shaft having an arm with a contact normally disposed longitudinally in line with the record adapted to engage said record to thereby rock the shaft and actuate the stop, and a brake shoe movable in unison with said
20 stop to arrest the revolution of the record.

3. In a phonograph and like apparatus, the combination of a revoluble record, a sound box, means whereby said box is advanced over the record, a spring pressed arm
25 having a stop member, a rockable shaft, a brake shoe carried by the shaft, said shaft having a part adapted to strike the record when it is advanced thereto whereby the shaft is rocked to move the brake shoe into
30 engagement with the record, a support for

the shaft movable in unison with the sound box, said shaft having, also, a member which contacts with said arm but which releases the arm when the shaft is rocked to thereby
allow the stop member to be applied. 35

4. In an apparatus of the character described, a brake and stop mechanism movable in unison with the movements of the sound box over the record, said stop mechanism including a support movable in unison
40 with the sound box, a bent rockable shaft mounted in said support having one portion in alinement with the record and having another portion provided with a brake shoe which is made to contact with the record
45 when the shaft is rocked, said shaft having a fixed stud, and said brake mechanism comprising a spring pressed arm having a stop member, said arm adapted to be engaged by said stud to release the stop member, and to
50 be released by the stud on the rotation of the shaft, to allow said stop member to be applied.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses. 55

FRANK H. ANDREWS.

Witnesses:

A. W. CUPID,

F. W. RUPPERT.

T. P. REED.
ATTACHMENT FOR SOUND REPRODUCING MACHINES.
APPLICATION FILED OCT. 30, 1908.

925,025.

Patented June 15, 1909.

Fig. 1.

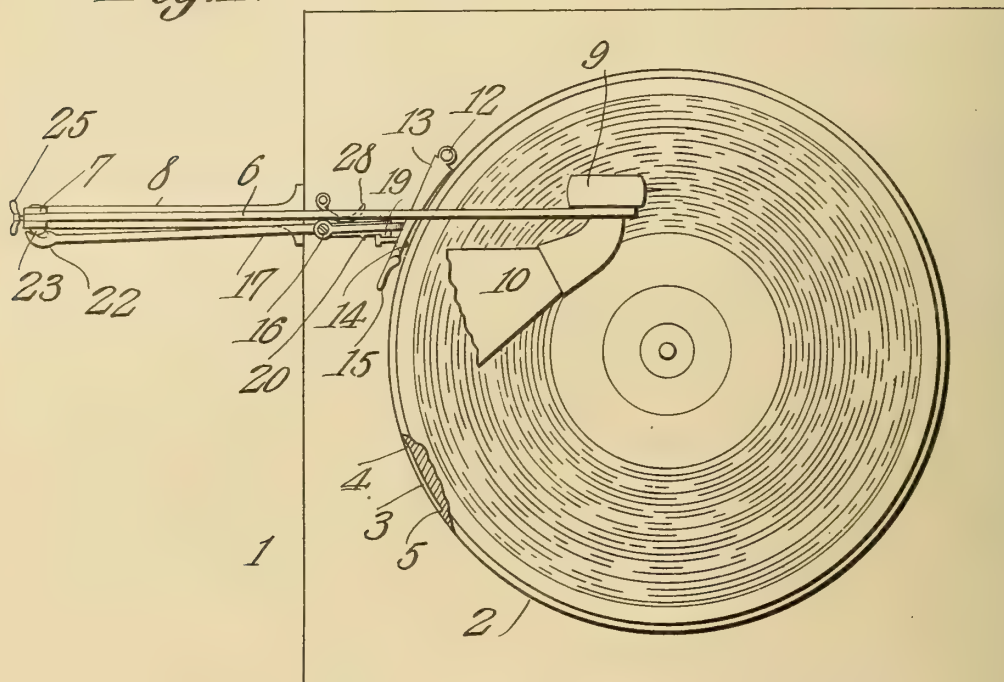
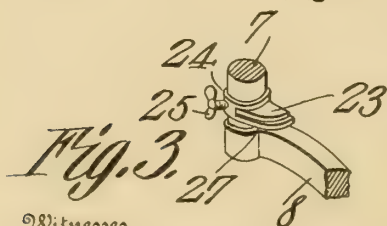
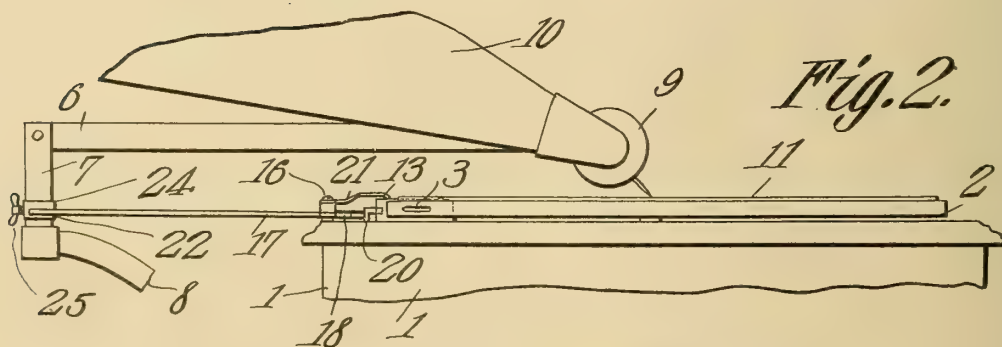


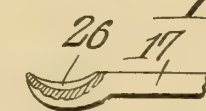
Fig. 2.



Witnesses

E. J. [Signature]
F. T. Chapman.

Fig. 4.



Inventor
Thompson P. Reed.

By *C. A. Snow & Co.*
Attorneys

UNITED STATES PATENT OFFICE.

THOMPSON PAXSON REED, OF RICHLAND, MISSOURI.

ATTACHMENT FOR SOUND-REPRODUCING MACHINES.

No. 925,025.

Specification of Letters Patent.

Patented June 15, 1909.

Application filed October 30, 1908. Serial No. 460,357.

To all whom it may concern:

Be it known that I, THOMPSON P. REED, a citizen of the United States, residing at Richland, in the county of Pulaski and State of Missouri, have invented a new and useful Attachment for Sound-Reproducing Machines, of which the following is a specification.

This invention has reference to improvements in sound reproducing machines and its object is to provide a means whereby the sound box or sound box carrying arm or parts attached thereto will cause the stopping of the tablet carrying table at the end of the sound record.

The present invention is designed more particularly for use in connection with that type of sound reproducing machines wherein the sound record is produced in a flat or disk like tablet and the tablet is mounted on a flat circular table set in rotation by suitable mechanism and the sound box is propelled across the sound record tablet by the engagement of the sound reproducing stylus in the sound record groove, the sound reproducing machine being of the type known as the gramophone.

While the invention is particularly adapted for use in the gramophone type of sound reproducing machines this does not preclude the use of the invention or operative parts thereof in connection with the type of sound reproducing machines wherein cylindrical tablets are used.

In accordance with the present invention there is provided a brake and stop member so situated with reference to the revolving table that when not restrained will engage the edge of the table and brake the same and ultimately positively engage the table in such manner as to hold the same against rotation until released. In connection with the brake mechanism there is provided a catch mechanism controlled by the swinging arm carrying the sound box so that when the sound box is in position to have the stylus engage the beginning of the record groove then the brake mechanism may be latched out of engagement with the table and when the sound box has traversed the record and reached the final portion thereof the brake mechanism will be released and the table will be automatically stopped.

The invention will be best understood from a consideration of the following detail description taken in connection with the ac-

companying drawings forming a part of this specification, in which drawings,

Figure 1 is a plan view of so much of a sound reproducing machine as is necessary for the understanding of the invention with the improved attachment applied thereto. Fig. 2 is a side elevation of the same, and Figs. 3 and 4 are detail views of a portion of the attachment.

Referring to the drawings there is shown a casing 1 commonly employed in instruments of this character for the reception and protection of the driving mechanism. On this casing there is mounted a revolving table 2 such as is commonly employed in sound reproducing machines of the character shown and in the edge or periphery of this table there is formed an elongated recess 3 having one end 4 sloping and ultimately merging into the periphery of the table and the other end 5 in the form of an abrupt shoulder substantially radial to the table. There is also shown in the drawings a swinging arm 6 mounted at the outer end on a swivel post 7 carried by a bracket 8 fast on the casing 1 and at the other end the arm 6 carries the usual sound box 9 to which sound box is connected the usual amplifying horn 10. There is also shown upon the table 2 a sound record tablet 11 of the usual disk type.

Pivoted at one end to the casing 1 by means of a pivot 12 is a brake shoe 13 in operative relation to the periphery of the table 2 and this brake shoe is provided on its active face near the free end with a projecting stud 14 adapted to engage in the recess 3 when the brake shoe is free to move toward the edge of the table 2. The end of the brake shoe remote from the pivot 12 is formed into a finger hold 15 by means of which the brake shoe may be manipulated in a manner to be described.

Mounted on a pivot stud 16 rising from the top of the casing 1 is a lever 17 having a short end 18 projecting toward the brake shoe 13 and this short end terminates in a tooth 19 adapted to engage a finger 20 fast on the shoe 13 and the parts are so proportioned that when the finger 20 is engaged behind the tooth 19 the brake shoe 13 is held out of engagement with the periphery of the table 2.

Along the stud 16 there is made fast a spring 21, preferably a leaf spring suitably bent to engage against the face of the brake

shoe 13 remote from the face designed to engage the periphery of the table 2 and this spring is of such strength and so shaped as to tend always to force the brake shoe
5 against the edge of the table 2 with sufficient force. At the same time the spring 21 will yield to a force applied to the finger hold 15 so that the brake shoe may be moved out of active engagement with the periphery of
10 the table 2 until the finger 20 is caught behind the tooth 19 and the brake shoe is thereby held against the action of the spring 21 out of engagement with the table 2.

The longer end of the lever 17 is continued
15 until adjacent to the swivel post 7 where the end of the lever 17 is formed to a head 22 adapted to be engaged by a cam 23 projecting from a collar 24 encircling the post 7 above the bracket 8 and held thereto by a set
20 screw 25 so that the sleeve 24 may be adjusted rotatively about the longitudinal axis of the post 7.

Since the post 7 is removed a considerable distance from the casing 1 and therefore the
25 long arm of the lever 17 is of considerable length, it is advisable to support the outer end or head 22 of this long arm of the lever and for this purpose the head 22 may be provided with a recess 26 into which there fits
30 a tongue 27 on the cam 23. This in no manner interferes with the action of the cam 23 and at the same time serves to support the outer or free end of the lever 17. Of course any other means for the same
35 purpose may be used.

A spring 28 on the casing 1 and engaging the shorter end 18 of the lever 17 serves to maintain the head 22 in constant engagement with the cam 23 and also tends to
40 move the tooth 19 toward the finger 20 when the outer end of the lever 17 is released from the action of the cam 23.

The parts are so proportioned that when the sound box 9 is in position to engage the
45 beginning of a record impressed in the tablet 1 which record is in the form of a spiral groove having its initial turns at or near the periphery of the record tablet 11, the cam 23 is in such position as to be out of active
50 engagement with the head 22 and the spring 28 thereby forces the lever 17 in a direction to bring the tooth 19 into the path of the finger 20. Now the brake shoe 13 is moved by the operator in a direction away from the
55 table 2 until the finger 20 snaps behind the tooth 19 and is there held, the position of the brake shoe 13 under these conditions being such that the stud 14 is out of engagement with the periphery of the table 2 as is also
60 the active face of the brake shoe 13.

The sound box is fed across the tablet 11 by the rotation of the latter and because of the spiral form of the sound record groove
65 the end of the sound record groove at the

inner edge of the annular zone occupied by the sound record groove.

In sound records of the disk type there are always a few turns of the groove at the end of the record which are left free from
70 sound and the cam 23 is so timed in operation that as the sound box 9 approaches the end of the record groove the cam 23 will have moved the long arm of the lever 17 so that during the few final blank turns of the
75 groove the tooth 19 is moved out of the path of the finger 21 and the brake shoe 13 is then free to be moved toward the periphery of the table 2 by the action of the spring 21. Under these conditions as soon as the rota-
80 tion of the table 2 has brought the recess 3 into coincidence with the stud 14 the latter drops into the recess 3 riding down the inclined end 4 and the active face of the brake shoe 13 is brought into engagement with
85 the periphery of the table 2 thus tending to stop its rotation which is rapidly slowed down by the braking action of the shoe 13 and ultimately the rotation of the table 2 is positively stopped by the engagement of the
90 stud or pin 14 with the abrupt shoulder 5 at the end of the recess 3, it being understood that the direction of rotation of the table 2 as viewed in Fig. 1 is clockwise. The rotation of the sound record tablet is thus automatic-
95 ally arrested without attention on the part of the operator and the continued rotation of the tablet often to the injury of the same by the stylus, because of inattention on the part of the operator, is thereby avoided. 100

It will be understood of course that the invention is not limited to the exact structure shown since such structure may be changed in many particulars without in any manner departing from the salient features
105 of the invention, for instance the invention is equally applicable to the taper arm type of sound reproducing machine as well as to the type illustrated in the drawings.

By using the brake and positive stop the
110 sound record disk is arrested in its rotation and yet without shock or jar.

What is claimed is:—

1. An attachment for sound reproducing machines comprising a brake member having
115 a brake and a positive stop element independent of the braking surface, and means for causing the active engagement of the braking surface and positive stop with the tablet carrier of the machine in the order
120 named.

2. In a sound reproducing machine, a brake member having a braking surface and a positive stop element independent of the
125 braking surface, a tablet carrier adapted to be actively engaged by the braking surface of the brake member and also provided with means for coacting with the positive stop element of the brake member, and means for causing the engagement of the braking sur- 130

face and positive stop with the tablet carrier of the machine in the order named.

3. An attachment for sound reproducing machines comprising a brake member having
5 a braking surface and a positive-stop element independent of the braking surface, a tablet carrier adapted to be actively engaged by the braking surface of the brake member and also provided with means for coacting
10 with the positive-stop element of the brake member, a lever having a catch member at one end adapted to hold the brake member in inactive position, and a cam adapted to be carried by the sound box supporting arm
15 of the machine in operative relation to the lever to actuate the latter to unlatch the brake member.

4. In a sound reproducing machine, a sound-record-tablet-carrying table having a
20 peripheral recess formed therein, a brake shoe in operative relation to the periphery of the table and provided with a stud projecting from its active face, and means controlled by the movement of the sound box
25 over the record tablet for holding the brake against action and for releasing it to action.

5. In a sound reproducing machine, a record-tablet-carrying table having an elongated
30 recess formed in its periphery, said recess having one end abrupt and the other sloping, a brake shoe in operative relation to the periphery of the table and having a stud projecting from its active face and adapted to engage in the elongated slot in the pe-
35 riphery of the table, and means controlled by the movement of the sound box over the record tablet for holding the brake against action and for releasing it to action.

6. In a sound reproducing machine, a
40 sound-record-carrying-table having an elon-

gated slot formed in its periphery, said slot having one end with an abrupt wall and the other end with a sloping wall, a brake shoe in operative relation to the periphery of the table and provided with a projecting
45 stud on its active face adapted to engage in the elongated slot in the table, a spring tending to force the brake shoe toward the table, a lever having one end formed to engage and hold the brake shoe in inactive position,
50 and a cam member carried by the sound box supporting arm of the machine and adapted to engage the lever to move the same out of latching relation to the brake shoe.

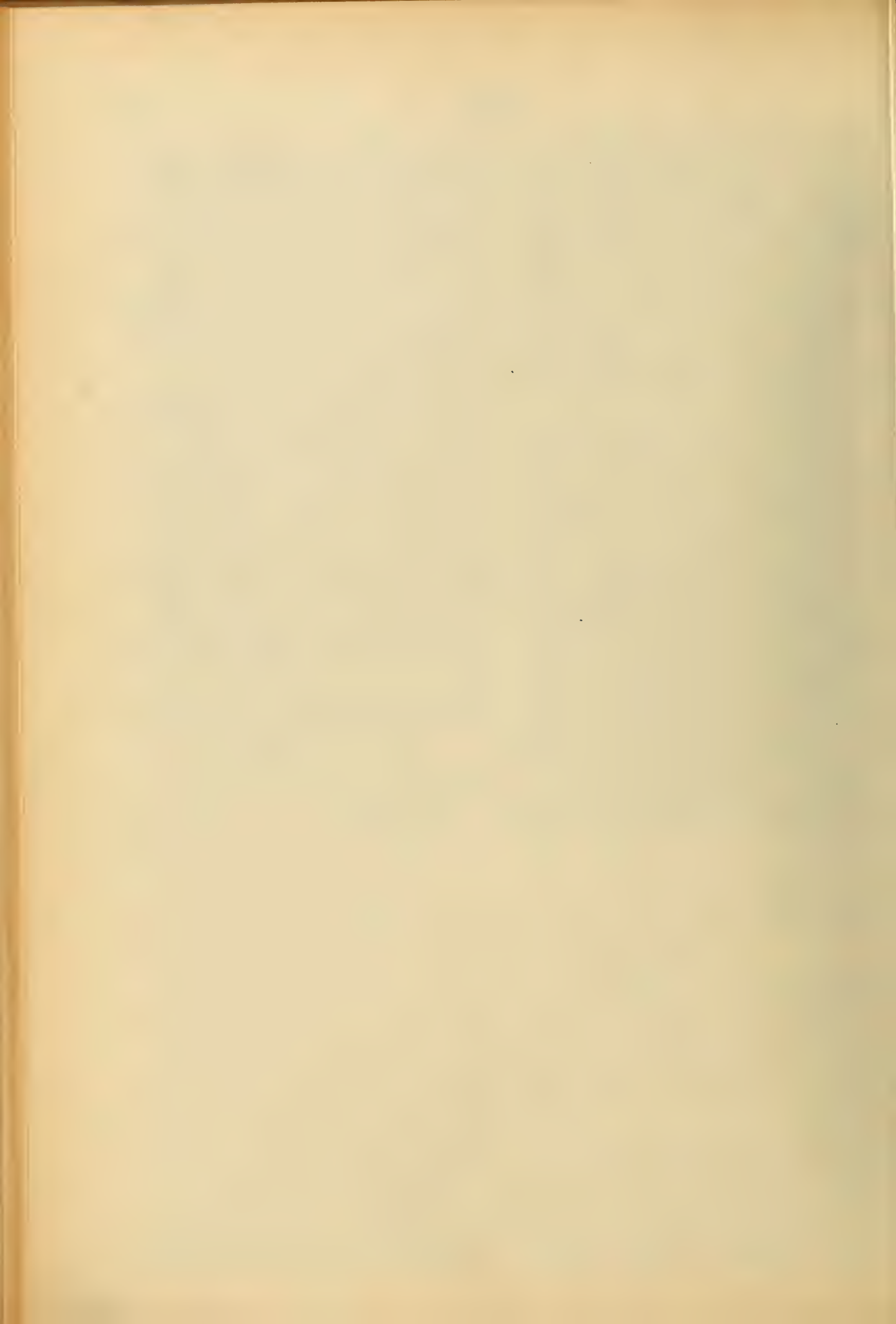
7. In a sound reproducing machine, a ro-
55 tatable sound-record-tablet-carrying table having in its periphery an elongated slot with one end wall abrupt and the other end wall sloping, a spring actuated brake shoe in operative relation to the periphery of the
60 table and provided with a projecting stud on its active face adapted to engage in the elongated slot on the table, a lever formed at one end with a catch member adapted to engage the brake shoe and hold the same in
65 inactive position, and a cam member carried by the swinging arm supporting the sound box of the machine and in operative relation to the said lever, said cam member being adjustable on said arm to determine the time
70 relation of its active engagement with the lever.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

THOMPSON PAXSON REED.

Witnesses:

NELLIE REED,
H. R. REED.

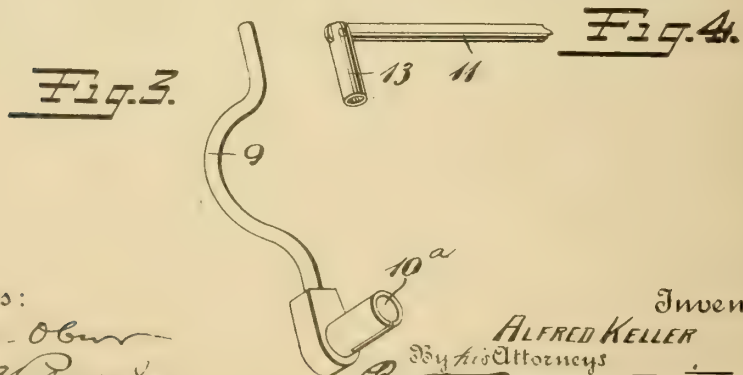
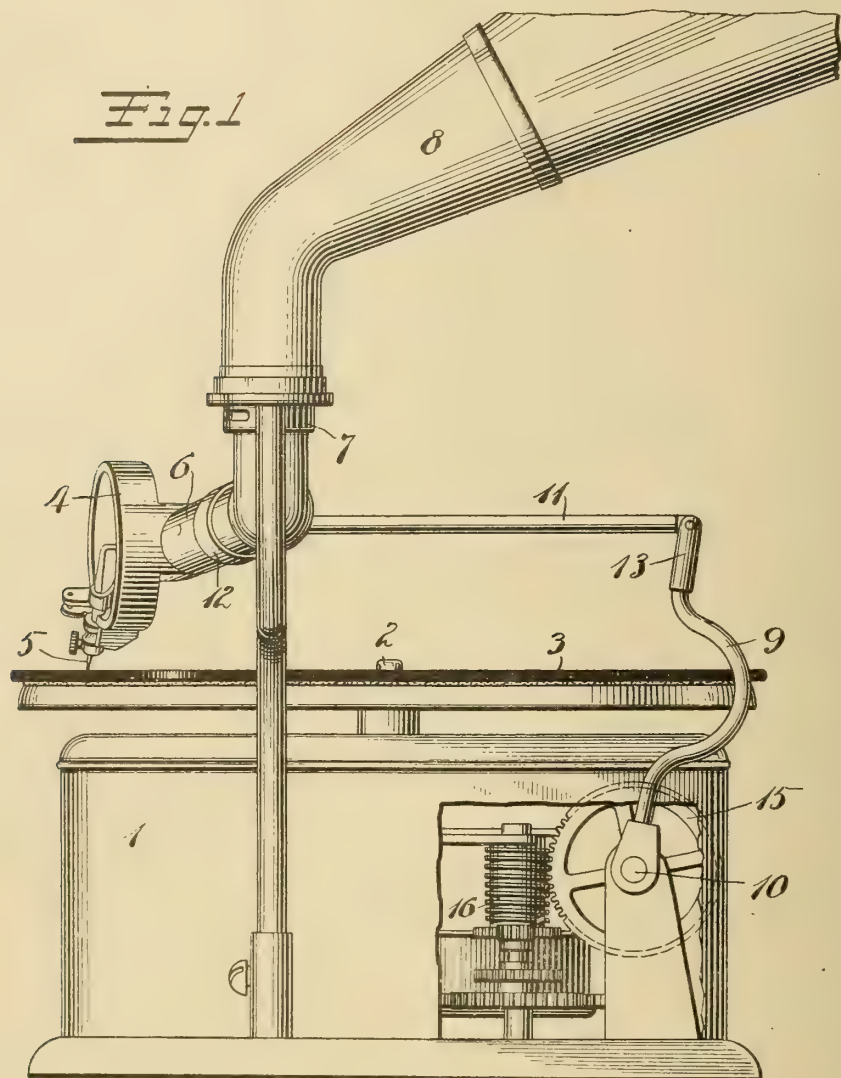


A. KELLER.
TALKING MACHINE.
APPLICATION FILED OCT. 4, 1907.

925,346.

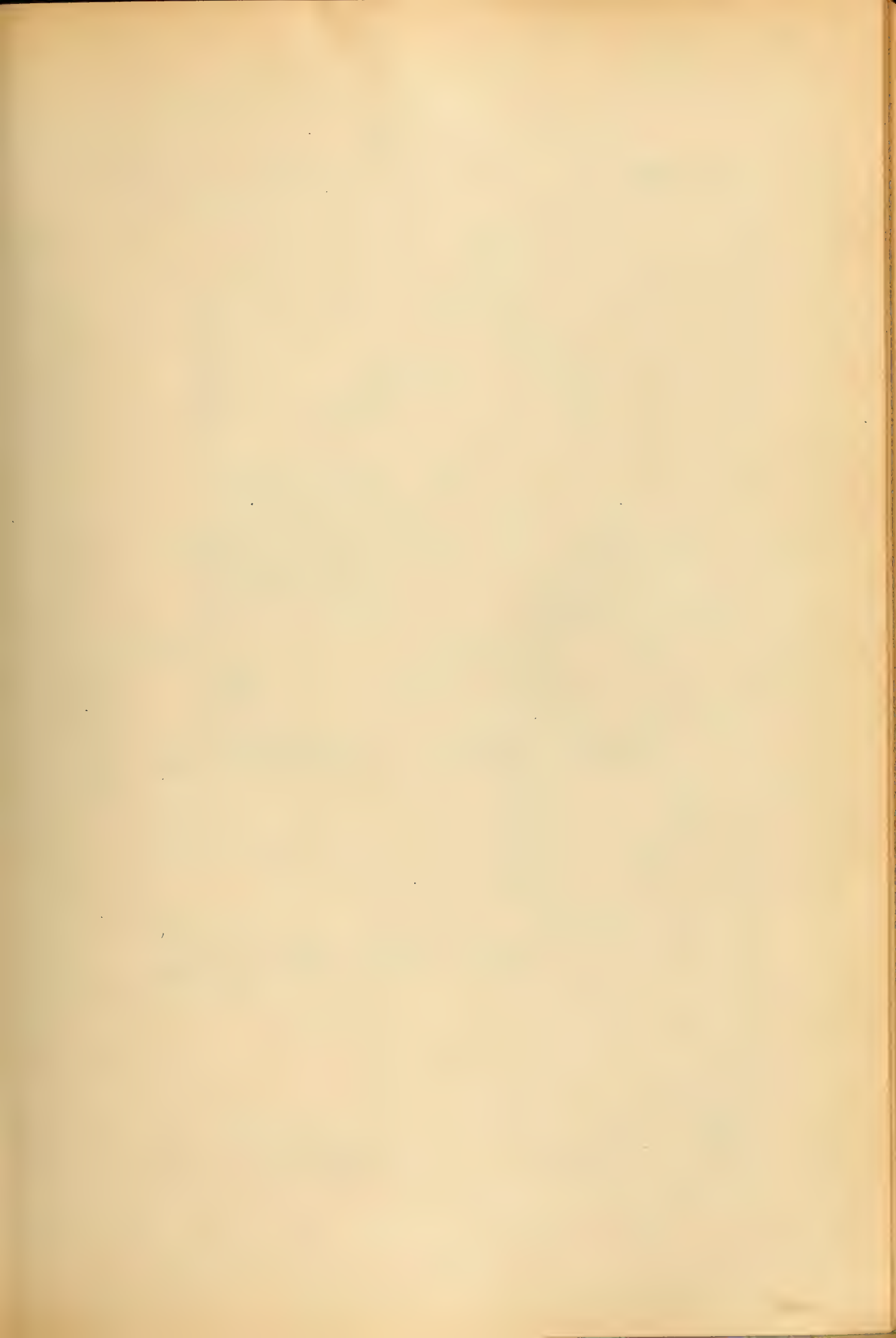
Patented June 15, 1909.

3 SHEETS—SHEET 1.



Witnesses:
Frank S. Ober
Charles A. Baird

Inventor
ALFRED KELLER
By his Attorneys
Bantel Bromberg Mutchler

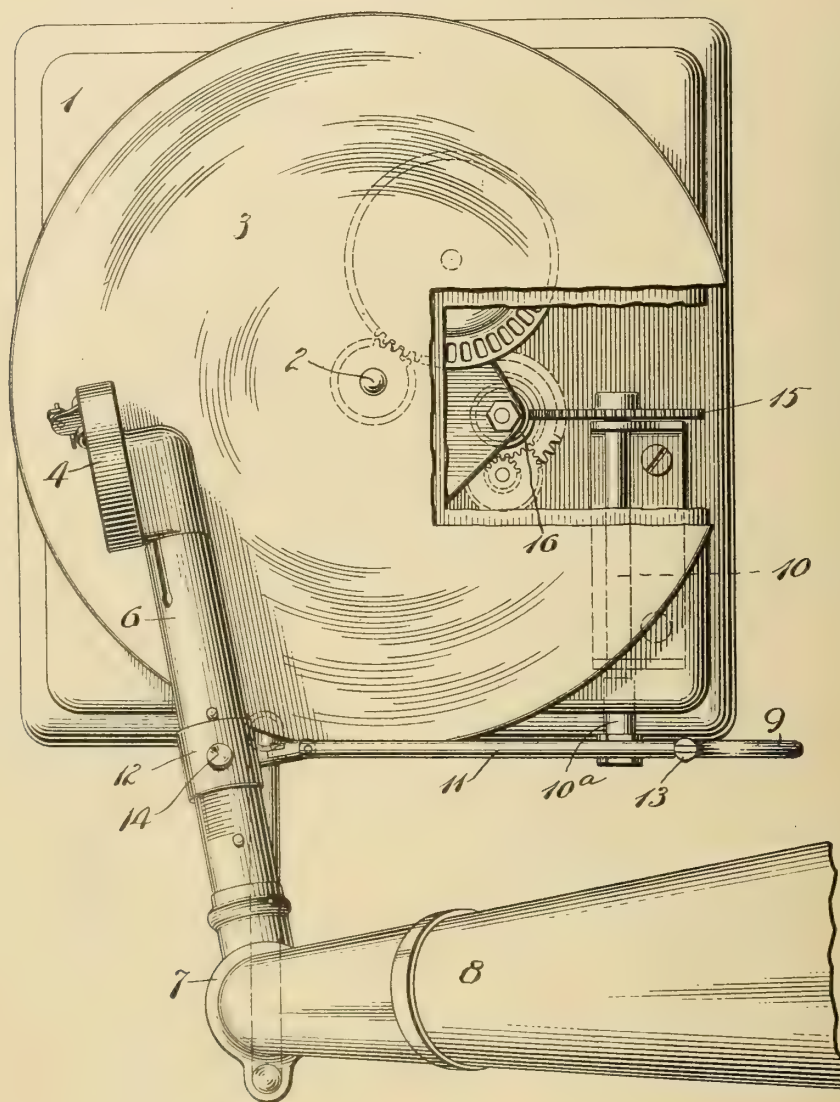


925,346.

A. KELLER.
TALKING MACHINE.
APPLICATION FILED OCT. 4, 1907.

Patented June 15, 1909.
3 SHEETS—SHEET 2.

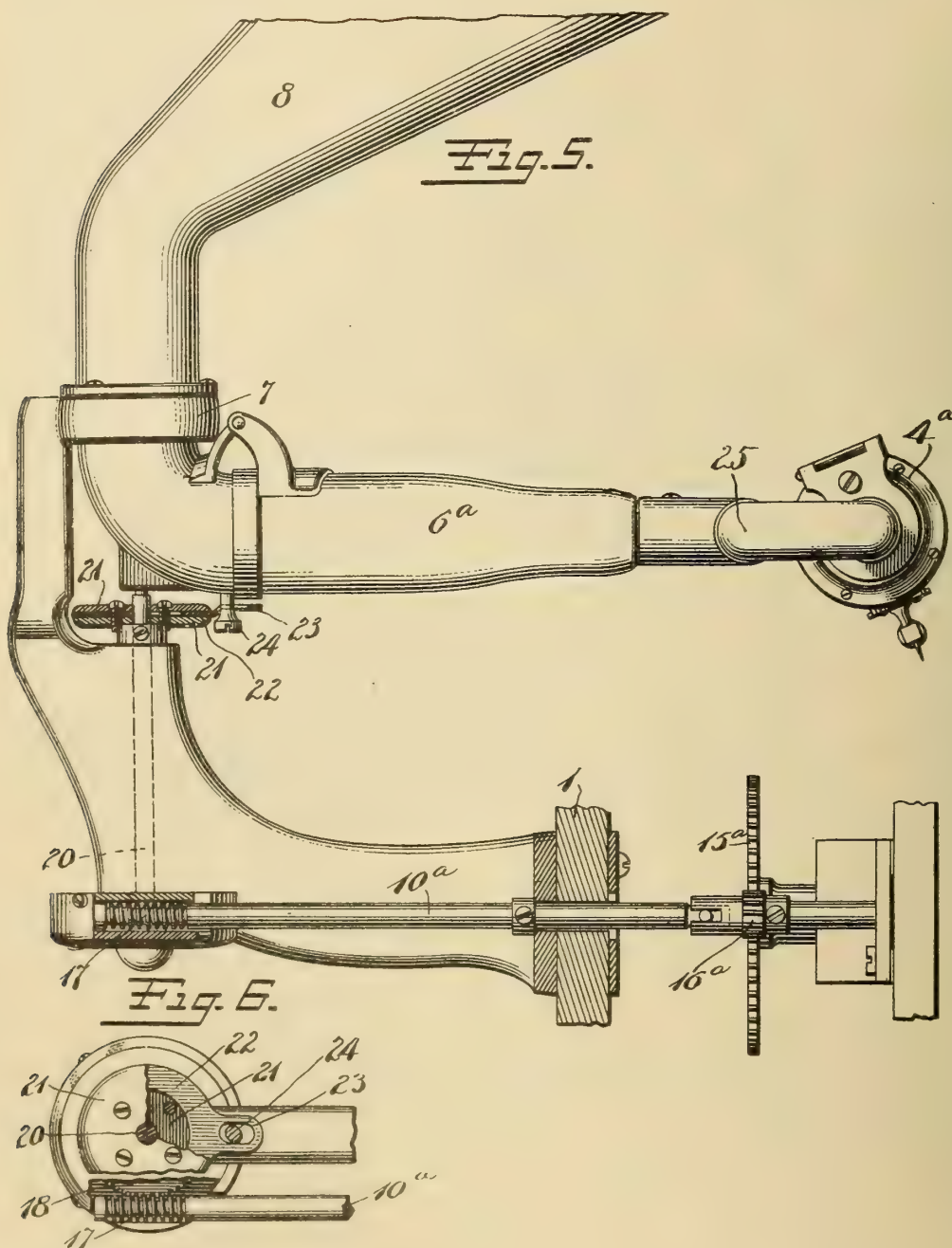
Fig. 2.



Witnesses:
Paul S. Ober
Chas. A. Reid

Inventor
ALFRED KELLER
By his Attorneys
Paul S. Ober, Berner, Mitchell

925,346.



Witnesses:
Francis S. Ober
Charles A. Reed

Inventor
ALFRED KELLER
By his Attorneys
Banker, Barnes & Whitehead

UNITED STATES PATENT OFFICE.

ALFRED KELLER, OF STE. CROIX, SWITZERLAND, ASSIGNOR TO MERMOD FRÈRES, OF STE. CROIX, SWITZERLAND.

TALKING-MACHINE.

No. 925,346.

Specification of Letters Patent.

Patented June 15, 1909.

Application filed October 4, 1907. Serial No. 395,945.

To all whom it may concern:

Be it known that I, ALFRED KELLER, residing at Ste. Croix, canton of Vaud, Switzerland, have invented certain new and useful
5 Improvements in Talking-Machines, of which the following is a full, clear, and exact description.

This invention relates to improvements in talking machines, the object being to provide
10 a simple and effective device for feeding the stylus arm over the record in such a manner as to cause the stylus point to register properly with the convolute or spiral groove in the record. By this means undue wear
15 upon one side of the groove and upon the stylus point is avoided when the reproduction of sound is made.

Heretofore in machines of this character the groove itself has been depended upon to
20 move the stylus point across the record, with the result that both the stylus point and the groove have been unnecessarily worn. By my invention this is avoided.

My invention also contemplates the further improvement in that it permits of varying the degree to which the stylus arm shall be fed, so as to vary the feed to accommodate it to the several different groove spacings. At the present time disk records are
30 made by various concerns having different spacings between the spiral convolutions. By a very simple construction I am enabled to at once adapt the feed mechanism to any spacing. This feed apparatus is also useful
35 for recording machines.

In the drawings, Figure 1 is a side elevation, partly broken away, of a talking machine constructed to embody my invention; Fig. 2 is a plan view thereof, also partly
40 broken away; Figs. 3 and 4 are perspective views of details of construction; Fig. 5 is a side view of a modification; and Fig. 6 is a plan view of certain details of construction shown in Fig. 5.

Referring first to Figs. 1 to 4 inclusive, 1 is the box or casing containing the usual motor mechanism, which it is unnecessary to describe, because any desired form of motor mechanism may be employed. 2 is the central spindle or arbor upon which the disk record 3 is mounted and by which it is rotated. 4 is the reproducer or sound-box.
50 5 is the stylus needle. 6 is a tubular arm carrying the reproducer, leading to a suitable bearing 7. This is so constructed that

the reproducer may be moved to and fro transversely across the record. 8 is the horn extension, for intensifying the sound. All of these parts may be of any well-known construction. 9 is a lever frictionally mounted
60 on an arbor 10, which has suitable supporting brackets. The frictional mounting preferably comprises a split sleeve 10^a which takes on the end of the arbor with sufficient snugness to cause the lever arm 9 to be
65 swung as the arbor rotates, but which may be slipped as occasion requires. 11 is a link connecting the arm 9 with the part 6, for example, through the medium of an adjustable sliding collar 12. 13 is a cap for the end of the arm 9, which affords a safe connection, the link 11 being hinged thereto. This cap 13 also permits the parts to be detached. The collar 12 may be provided with a set-screw 14 to permit the collar to be
adjusted at any desired point on the member 6, nearer to or farther away from the axis of rotation in the bearing 7. 15 is a gear-wheel mounted on arbor 10 and meshing with the worm-screw 16, driven by the motor within the case 1. Proper gearing should, of course, be provided, so that when the disk record 3 has been revolved one complete revolution, the arbor 10 will have moved and shifted (through the medium of lever 9 and link 11) the arm 6 to a sufficient extent to move the stylus point the full width of the space between adjacent convolutions in the record. Inasmuch as these convolutions vary in spacing in different makes of records, this may be readily cared for by shifting the position of the collar 12 on the arm 6. Another way to accomplish the same object would be to shift the connection of link 11 on lever 9 nearer to or farther away from arbor 10. By providing a frictional connection between lever-arm 9 and arbor 10, the operator may freely lift the reproducer and swing the arm 6 to and fro, without damage to the gears or any of the associated parts.

In the modification shown in Figs. 5 and 6, 1 represents a portion of the box, as before. 16^a represents a spur gear on the motor shaft. This meshes with a spur gear 15^a on the arbor 10^a. This arbor 10^a is provided with a worm 17 meshing with gear 18. 20 is a shaft driven by gear 18, carrying the adjustable friction disks 21, 21'. Between these disks is a friction-plate 22 having a
40

slotted off-set arm 23. 24 is a pin passing through the slot in the arm 23 and connected to the stylus arm 6^a. As the motor shaft revolves, it is obvious that through the several connections aforesaid, arm 6^a will be moved so as to give the proper feed to the stylus point. When the operator desires to shift the stylus point, this may be done by lifting the reproducer and swinging it at will.

In the form shown in Figs. 3 and 4, the reproducer 4^a is transversely hinged at the point 25 so that it may be lifted.

What I claim is -

1. In an apparatus of the character described, means for rotating a disk record, means for supporting a reproducer, including a swinging arm, means of connection between the motor and the swinging arm for imparting a swinging feeding movement to the latter as the disk-carrying means is revolved and means to permit the return of the arm without disconnecting the same from the feeding means.

2. In an apparatus of the character described, means for rotating a disk record, means for supporting a reproducer, including a swinging arm, means of connection between the motor and the swinging arm for imparting a swinging feeding movement to the latter as the disk-carrying means is revolved, and means for varying the degree of feed relatively to the diameter of the disk record used.

3. In an apparatus of the character described, means for rotating a disk record, means for supporting a reproducer, including a swinging arm, means of connection between the motor and the swinging arm for imparting a swinging movement to the latter as the disk-carrying means is revolved, and a friction clutch connection between the swinging arm of said means.

4. In a talking machine, a support for a disk record, means for rotating said support, a reproducer, an arm, a hinged bearing at one end of said arm, means for moving said arm to cause the free end thereof to traverse said record, said means being operatively connected to the means for rotating the disk record and means to permit the return of the arm without disconnecting the same from the means for causing the free end thereof to traverse said record.

5. In a talking machine, a support for a disk record, means for rotating said support, a reproducer, an arm, a hinged bearing at one end of said arm, means for moving said arm to cause the free end thereof to traverse said record, said means being operatively connected to the means for rotating the disk record, and including a friction clutch connection between the arm of said means.

6. In a talking machine, a support for a disk record, means for rotating said support, a reproducer, an arm, a hinged bearing at one end of said arm, means for moving said arm to cause the free end thereof to traverse said record, said means being operatively connected to the means for rotating the disk record, including a lever-arm, a shaft support therefor and frictional connection between the two, and a link leading from said lever-arm to said swinging arm.

7. In a talking machine, means for rotating a disk record, a hinged arm for carrying a reproducer, a reproducer supported by said arm away from the hinged portion thereof, a disk record having a spiral groove therein, a stylus point carried by the reproducer, and feeding means operatively connected and driven from the same source of power that drives the disk record to cause said swinging arm to move at a speed sufficient to cause the stylus point to follow the spiral groove in the record and a friction clutch connection between the lever and feeding means.

8. In a talking machine, a disk, a stylus, a hinged carrying-arm for said stylus, means for rotating the disk, and means for swinging the stylus arm, driven from the same source of power as employed for rotating the disk and means allowing the return of the arm without disconnecting the same from the driving means.

9. In a talking machine, a disk, a stylus, a hinged carrying-arm for said stylus, means for rotating the disk, means for swinging the stylus arm, driven from the same source of power as employed for rotating the disk, and means for varying the degree to which said stylus arm is swung relatively to the diameter of the disk.

ALFRED KELLER.

Witnesses:

L. H. MUNIER,

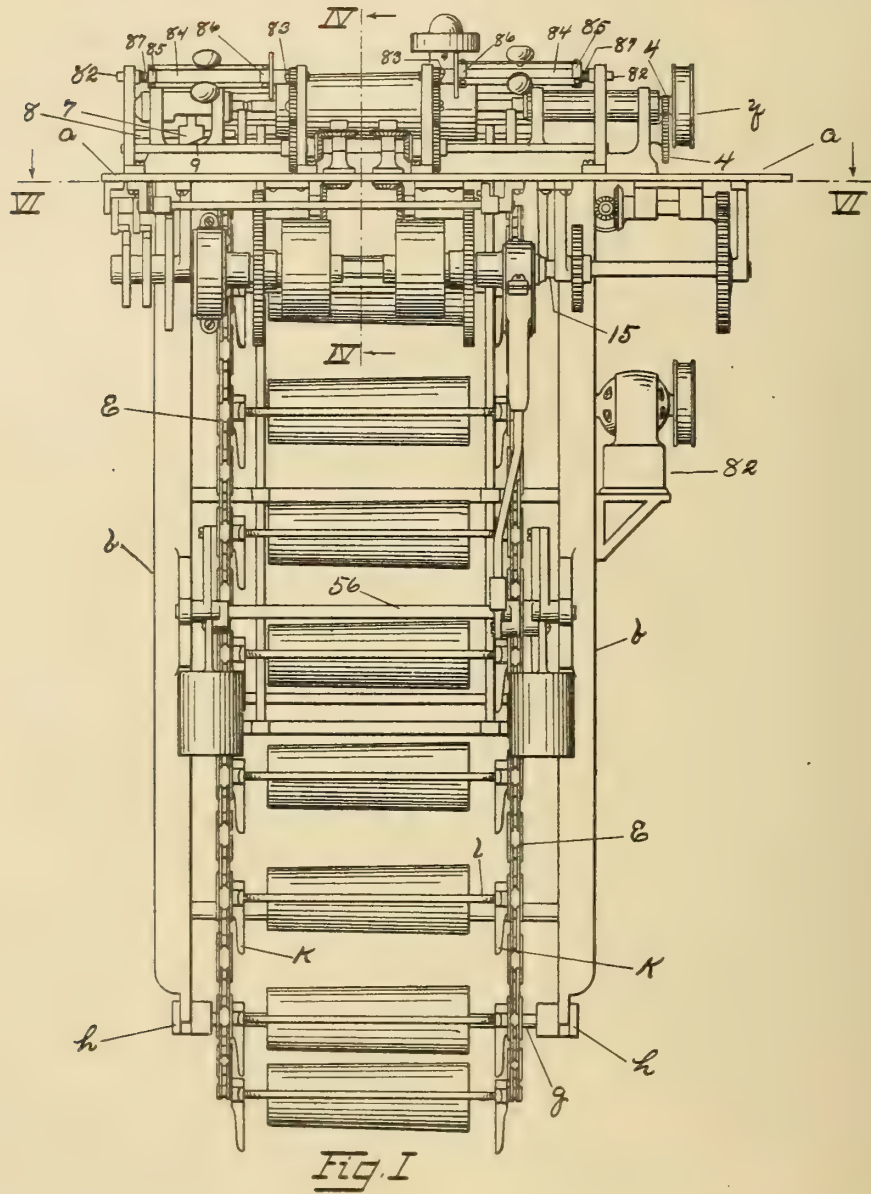
FRANCIS B. KEENE.

J. I. GEMMILL.
 AUTOMATIC MULTIPLE RECORD PHONOGRAPH.
 APPLICATION FILED SEPT. 22, 1905.

925,430.

Patented June 15, 1909.

4 SHEETS—SHEET 1.



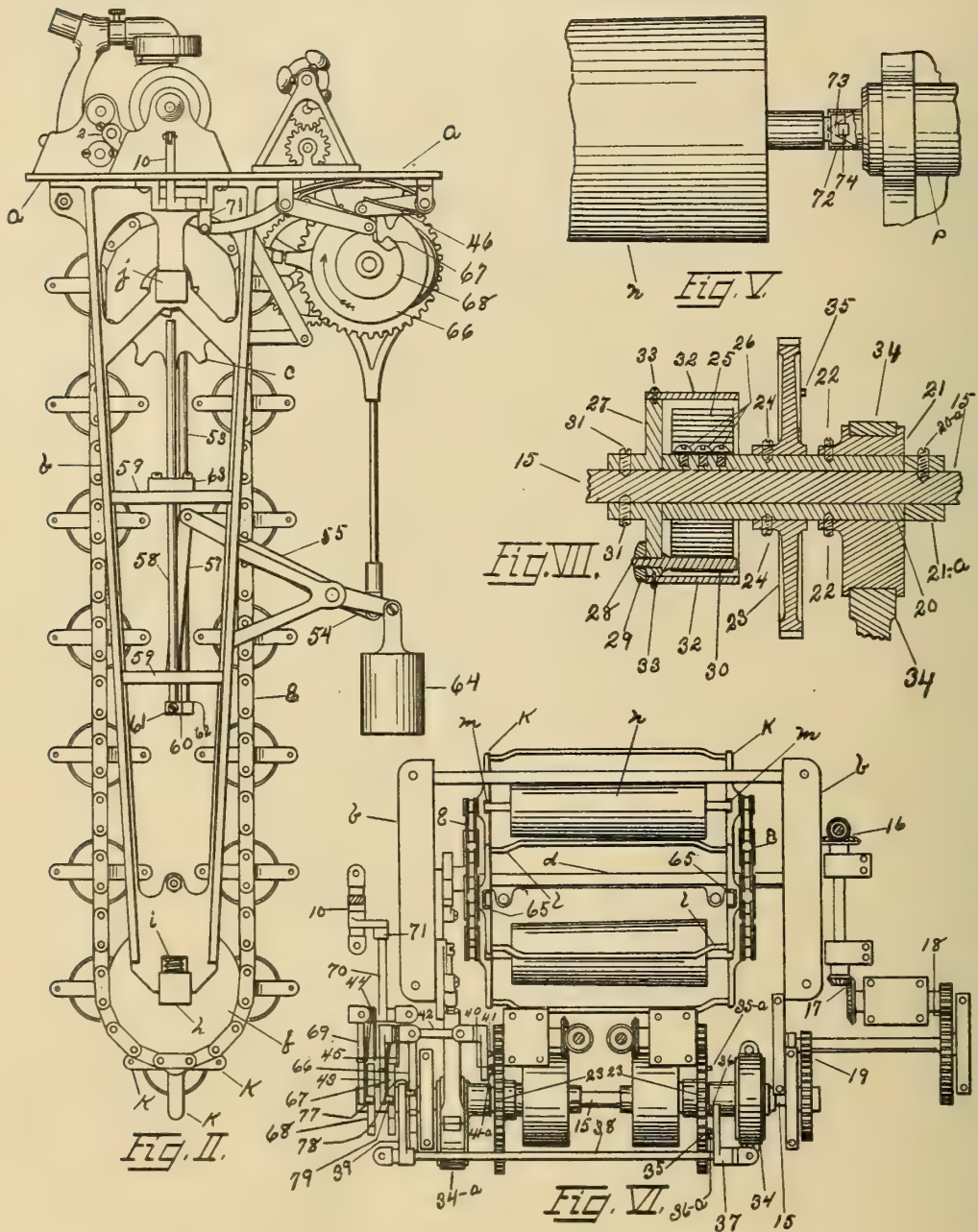
Witnesses:
 A. C. Valentine
 Leta M. Gemmill.

Inventor,
 James I. Gemmill.

J. I. GEMMILL.
 AUTOMATIC MULTIPLE RECORD PHONOGRAPH.
 APPLICATION FILED SEPT. 22, 1905.

925,430.

Patented June 15, 1909.
 4 SHEETS—SHEET 2.



Witnesses:
 H. C. Valentine
 Leta M. Gemmill

Inventor,
 James I. Gemmill.



J. I. GEMMILL.
 AUTOMATIC MULTIPLE RECORD PHONOGRAPH.
 APPLICATION FILED SEPT. 22, 1906.

925,430.

Patented June 15, 1909.

4 SHEETS—SHEET 3.

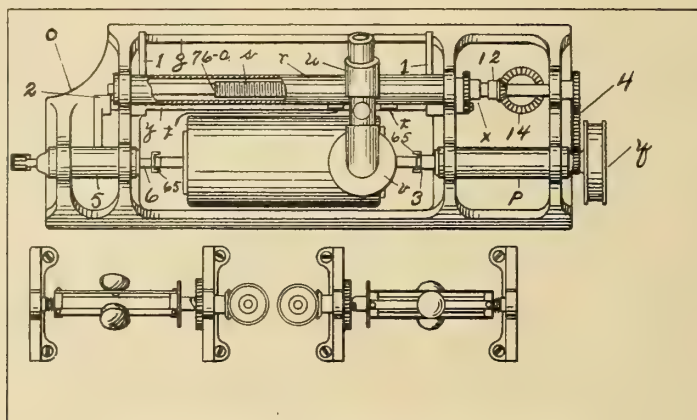


Fig. III.

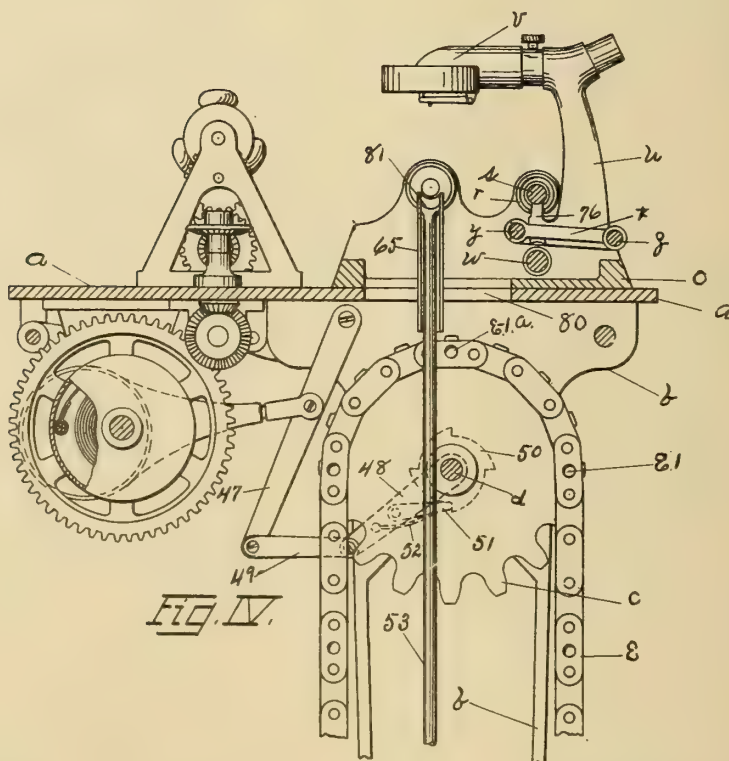


Fig. IV.

Witnesses:
 H. C. Valentin
 Leota M. Gemmill

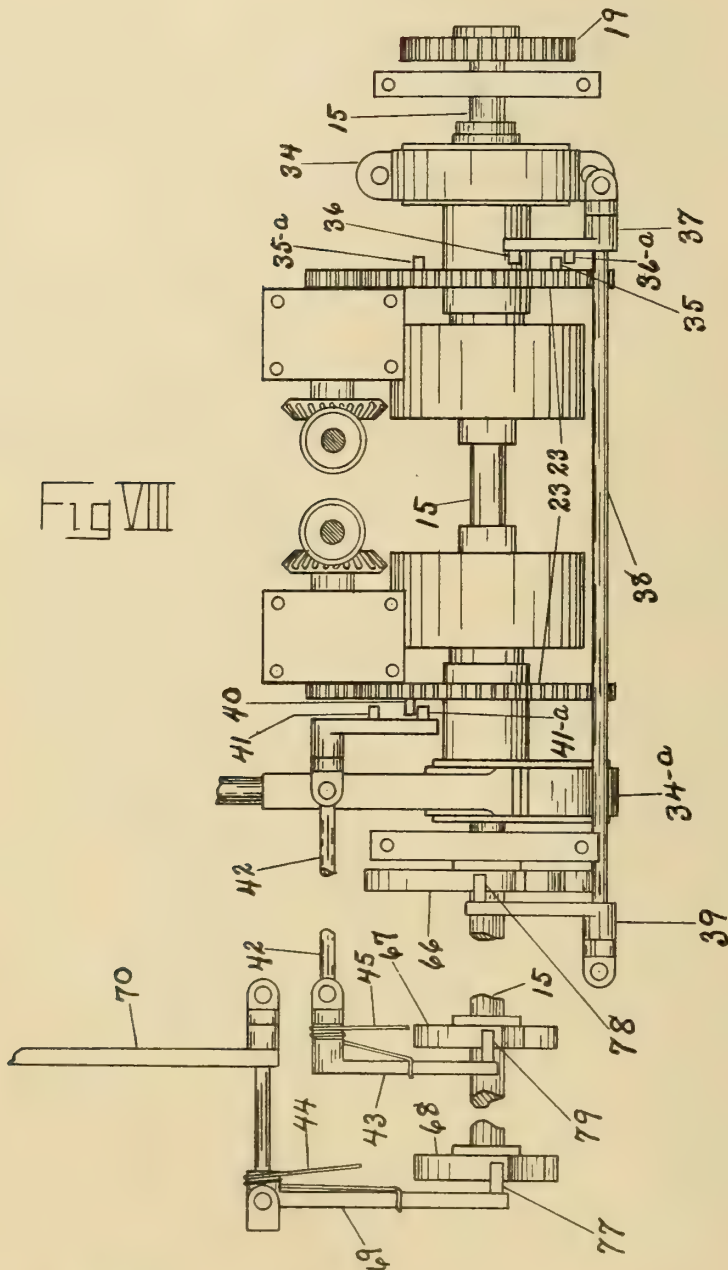
Inventor,
 James I. Gemmill.

J. I. GEMMILL.
 AUTOMATIC MULTIPLE RECORD PHONOGRAPH.
 APPLICATION FILED SEPT. 22, 1905.

925,430.

Patented June 15, 1909.

4 SHEETS—SHEET 4.



WITNESSES:

Leota M. Gemmill.

Robt. S. Shaw.

James I. Gemmill. INVENTOR

UNITED STATES PATENT OFFICE.

JAMES I. GEMMILL, OF CLEVELAND, OHIO.

AUTOMATIC MULTIPLE-RECORD PHONOGRAPH.

No. 925,430.

Specification of Letters Patent.

Patented June 15, 1909.

Application filed September 22, 1905. Serial No. 279,647.

To all whom it may concern:

Be it known that I, JAMES I. GEMMILL, a citizen of the United States, resident of Cleveland, county of Cuyahoga, and State of Ohio, have invented a new and useful Improvement in Automatic Multiple-Record Phonographs, of which the following is a specification, the principle of the invention being herein explained and the best mode in which I have contemplated applying that principle, so as to distinguish it from other inventions.

My invention relates to automatically-operated mechanisms and particularly to an automatic multiple-record phonograph.

The object of said invention is to produce a talking machine of the character described which shall be continuous in its action and shall operate for the purpose of repeating a complete discourse or speech of an indefinite length and impressed on a series of tablets or phonographic records manipulated automatically by the machine without any attention or attendance in any way by the operator. In carrying out this, my object, I have introduced novel mechanical features in the preferred forms of the different mechanisms comprising the machine, which will be hereinafter fully illustrated and described, and completely set forth in the appended claims. These results are obtained by the mechanism illustrated in the accompanying drawings, which form a part of these specifications.

Referring to the drawings: Figure I is a vertical view of the machine as seen from the rear. Fig. II is a vertical side view of the machine looking at the left-hand side, as in Fig. I. Fig. III is a top view of the machine above lines VI VI, Fig. I, showing the governor and a common form of a phonograph partly in section. Fig. IV is a sectional side view of a portion of the machine viewed through lines IV IV in Fig. I, looking at the left side. This figure shows the mechanism for rotating the sprocket wheels operating the chains on which are suspended the cradles supporting the record arbors; also shows the connecting of the governor to said mechanism and disclosing in section a portion of the clock spring which operates same, together with a view of one of the rods which carry the record and its arbor from the cradle to a point between centers above the plate in which position the record is played. Fig. V is a

view of an arbor and a portion of the head or bearing containing the principal driving spindle and showing the chuck piece and its relation to the shaft bearing the arbor. Fig. VI is a view from the top with all of the mechanisms removed above lines VI VI, Fig. I, together with one of the arbors. Fig. VII is a section of one of the spring-driven eccentrics, together with one of the main escapement wheels, showing the construction of same and its relation to the shaft which is adapted to support and drive it; Fig. VIII is an enlarged view of the shaft disclosing the relative positions of the levers and cams, also the detents used for intermittently starting and stopping the gearing operating the eccentrics to produce the several motions of the mechanism.

Similar characters refer to similar parts throughout the several drawings.

In a more particular reference to the drawings, in Fig. I, *a a* is a plate on which is placed the phonograph, together with the governors which govern the speed of the mechanism below the plate. Hereafter all of that mechanism which is sustained by and above the plate will be known as the upper part, and below it as the lower part. In Fig. I, which is the most complete disclosure of my device, *b b* shows the framework for the record elevating means. Fig. II serves to show how this frame is adapted to sustain the sprocket-wheels *c c*, one of which is shown and both being completely covered up by the prolixity of the drawings in Figs. I and VI. These sprockets *c c* are mounted on a shaft *d*, Fig. VI, in such a manner as to make their teeth co-incidental with each other while passing a given line parallel with the axes on which they rotate. On either of these two wheels is placed a chain, *e e*, the links of which are perforated on one side of the chain only, as at *e* 1, Fig. IV, and the chains are positioned on their respective wheels in such a manner as to bring the perforations on the inner sides of the chains and opposite each other. These chains, *e e*, are adapted to run over a pair of plain wheels, one of which is shown at *f*, Fig. II, said wheels being mounted on a shaft *g*, Fig. I, and adapted to a bearing *h h* at either end. Said bearings are grooved on either side and fitted to the slots in the bottoms of the frames *b b* and are slidable there in. Short spiral springs *i i*, one of which is shown in Fig. II, serve to keep a tension

on the chains and take care of all the slack in same, also any undue strain due to any slight eccentricity of the sprocket-wheels *c c* or the wheels *f f*. The sprocket-wheels and shafts are mounted in a pair of bearings, one of which is shown at *j*, Fig. II. These shafts are not shown as extending clear through their respective bearings, but are mounted therein in such a manner as to bring the sprockets and their respective idlers below into a perfect alignment, one with the other. The aforementioned perforations or holes *e—1* in the chains *e e* are uniformly spaced apart and in each of them is mounted the trunnion ends of a cradle, which is made up of small castings, one of which is shown at *k k k*, Fig. II, and which are held together by the two bent or formed wires *l, l*, Fig. VI. The inner sides of these two castings or ends, *k k k*, are slotted as at *m m*, Fig. VI, said slots being positioned in the castings so as to be equidistant from the two side wires *l, l*, and extending downward below the pins serving as trunnions on which the cradle is hung; these pins being positioned centrally with regard to the horizontal position of said ends *k k k* as shown at the bottom of Fig. II and are riveted therein flush with the bottom of said slot. The function of this cradle is to hold a metal arbor end, Fig. VI, on which may be placed a standard cylinder record. The ends of the shaft on which the arbor is mounted are adapted to enter the slots *m m* in the cradle and rest therein at the bottom, below the level of the aforementioned trunnion pins, on which the cradle is supported on the chain by means of holes in the links of same. It is obvious that, owing to the center of gravity being below the trunnions, the cradle with its arbor therein will always retain its relative position or equilibrium through all of the phases of its progress in its orbit around the periphery of the sprockets and idlers.

The phonograph shown in Fig. III is of a common form but special design to conform to the requirements of the machine as a whole. In Fig. III, *o* shows a base, *p* is a long bearing through which is placed the principal driving shaft, adapted to rotate therein and which is driven by a belt wheel *q*. The innermost end of this shaft is equipped with a chuck *3*, adapted to engage with the end of a record arbor and drive same. A dust proof covering *r* is provided for a transverse screw *s*, which operates the carriage, a suggestion of which is shown at *t, t*, and which is further shown at *z* in Fig. IV. This carriage *t* serves to sustain the arm *u* with the reproducer *v*. A second screw, not shown in Fig. III, but sectionally shown in Fig. IV at *w*, is placed directly below the screw *s*, and is adapted to exert pressure and cause motion in an opposite

direction from that caused by the screw *s*. The two screws are connected by a gearing at *x*, Fig. III. The carriage *t* is adapted to slide on the two rods *y* and *z*, which are held in parallel relation to each other by the levers *1 1*. The whole combination is adapted to move through a short arc, using the operating shaft *y* as a radius point. A lever *2* serves to impart motion to the shaft *y*. The shaft within the bearing *p* is connected to the screw *s* by means of the gears at *1*, Fig. III. Another bearing at *5* contains a slidable center *6*, which is connected to a block *7*, Fig. I, through a slot in said bearing. The block *7* is attached to a slidable shaft *8*, Fig. I, and is cut away at *9* so as to present an incline plane or surface, which is adapted to engage the end of the lever *2*, Fig. III. The shaft *8*, Fig. I, is attached to the bell-crank *10*, Fig. II, and the whole is operated thereby in such a manner that when the center *6* is withdrawn the lever *2* operates the rod of shaft *y* and the levers *1—1*, together with the rod *z* and the carriage *t* to disengage the nut *76*, Fig. IV, from the screw *s* and engage the same with the screw *w*, immediately after said disengagement. The bevel gears at *12* and *14*, Fig. III, serve to transmit motion to the shaft *15*, Fig. I, by means of the intermediate gears and respective shafts shown at *16*, *17*, *18*, and *19*, in Fig. VI. This shaft *15*, Figs. I, VII and VIII, serves to carry the power-springs and driving eccentrics for the actuating mechanism essential to the operation of the sprocket-wheels and chains, also the elevator to elevate a record arbor from the said chains to a point between centers.

In Fig. VII, the shaft *15* serves to sustain a loosely fitting sleeve *20*, on which is placed an eccentric *21*, which is attached to said sleeve by set screws *22 22*, the main escape-ment wheel *23* being attached to the sleeve also by means of set screws *24 24*. A clock-spring *25* is shown attached by means of screws to the same sleeve at *26*, a plate *27* carrying a stud *28* attached to said plate and held in position by the nut *29*, serving to engage the outermost end of the clock-spring *25* as shown at *30*. The plate *27* is attached permanently to the shaft *15* by set screws *31 31* and a barrel *32 32* is attached to said plate on its periphery by means of screws *33 33* and serves as a protection of the aforementioned clock-spring. It is obvious that the shaft *15* being always in motion it will have a tendency to wind up the springs and when released, the wheel *23* and eccentric *21* will move forward performing their work. The eccentric bands are shown at *34 34*. The lug *35* on the wheel *23* serves to operate as a detent for the mechanism and is adapted to act against a similar lug *36* on the lever *37*, Figs. VI and VIII. This lever is operated by a shaft *38* and accompanying lever

39. The lug on wheel 23 shown at 35^a is identical with the lug 35, but diametrically opposite; so that this wheel is stopped twice in one revolution and in consequence will make only half of a revolution at a time. Lugs 40 and 41 are identical with lugs 35 and 36 and the lever to which lug 40 is attached is operated by the shaft 42 and lever 43. Springs 44 and 45, Figs. VI and VIII, and spring 46, Fig. II, serve to maintain a pressure on levers and shafts and keep them at their normal positions at all times, while in motion. The eccentric 34^a serves to operate the levers 47 and 48, Fig. IV, by means of a link 49. The lever 48 is attached to and moves freely on the shaft *d*, operating a ratchet-wheel 50 by means of a pawl 51, said pawl being held in place by a spring 52. The ratchet-wheel 50 is secured to the shaft *d* and when operated by the spring-actuated eccentric and levers is adapted to move forward, carrying the shaft *d* but one-fourth of a revolution. This motion disposes of one record and brings up a new one as will be readily understood and made obvious by the spacing of the holes of the aforementioned chains as at *e*¹ and *e*^{1a} in Fig. IV. The chain *e* and the sprocket *c* have been set back on the shaft *d* in Fig. IV in order to show the quartering of the circumference of the wheel *c* by the aforementioned perforations in the chains. The hole *e*^{1a} would more properly be just back of the rod 53. The eccentric 31 serves to operate the levers 54 and 55, Fig. II, which are sustained by the shaft 56 in Fig. I. The said levers serve to operate the elevator by means of links 57, Fig. II. The elevator is made up of rods 58, which serve as guides for the whole, and rods 53 which are the elevators in fact. The rods 58 are adapted to slide through pieces 59 59 and are attached at the bottom to a cross piece 60 being held therein by screws 61. The rods or elevator shafts 53 are attached to this cross-piece permanently at 62, and are adapted to slide through a cross-piece guide at 63. Counterbalancing weights 64, Fig. II, serve to give this system an equipoise when an arbor and record is on the elevator. In Fig. IV, a channel 65 is shown which is again shown in Figs. III and VI and which serves to guide the ends of the arbor shafts from the points *m m* in Fig. VI to and between point 6 and the chuck 3, Fig. III.

The shaft 15, Fig. VI and VIII has three circular plates permanently attached to it at its outermost end, said plates constituting cams and disclosed as 66, 67, and 68. These plates have irregular indentations in their respective edges of such a nature and shape as to give (while in motion) a performance of motion to the levers 32, 33, and 69, peculiarly adaptable to the performance of their several functions. The lever 69 operates

the lever 70, Fig. VI and by means of the link 71, Figs. II and VI, and the bell-crank 10, Fig. VI, serve to operate the shaft 8, carrying the block 7, Fig. I. The chuck piece on the shaft within the bearing *p*, Fig. III, is shown in detail in Fig. V, in connection with a broken elevation of a record and its arbor and shaft, the end of which, together with the chuck 3, is cut away showing sectionally the cup-shell 72 and its center 73. A square pin 74 is shown as passing clear through the cup 72, together with the center 73. The center is an ordinary 60 gedree one and is adapted to take the end of the arbor shaft by reason of it having its center reamed for that purpose. Across one end of the arbor shaft a square slot is cut which adapts it to engage with the square pin when the arbor shaft has been pushed well up on to the center, thereby engaging the arbor and rotating it. The speed of the shaft 15 compared with the speed of the main shaft is in the ratio of; as one is to a sufficient number of revolutions of said main shaft operated by the wheel *q* to successfully operate and play the longest possible record.

The motor 82, Fig. I, is shown in place and is intended to be belted direct to the wheel *q*. The coin-slot and the conveyer, together with the switching device, are not shown, as they are common, and are well understood. It will appear obvious that this machine is intended to be inclosed in a cabinet as it is adapted to be suspended therein by means of the edges of the plate *a a*, although said arrangement, including the cabinet, is not shown. Each of the two escapement wheels 23 23, Fig. VI, is supplied with a governor. Said governors are of a simple form and are connected with said escapement wheels 23 23 by gears as shown in Figs. I, IV, and VI. In Fig. I the governors shown on the plate *a* are identical and shaft 82 is supplied with a pin 83 which serves to engage with a ratchet tooth in the end of the sleeve 84, which is mounted loosely on the shaft so that it may rotate. The portion 85 is permanent to the sleeve and the portion 86 is slidable thereon, the lugs and weights being attached thereto. A spiral spring 87 serves to hold the ratchet sleeve against the pin 83, so that when the gear comes to a stop suddenly the governor will so cause to revolve and thereby be spared the sudden jar due to an instant cessation of motion. It finally comes to a stop of its own accord.

The action of the machine is as follows: An arbor with its record being placed within said cabinet as in Figs. I and III, the motor being started, the reproducer being down so that the jeweled contact pin is in actual contact with the record, the reproducer starts over the record to play same. The arms are in position as in Fig. II and will rotate as

indicated by the arrow on cam 66. Upon the record having been played, the screw *s* Fig. III, will drop the nut 76, Fig. IV, at 76^a, Fig. III, and immediately after the cam 78, Fig. VI, will have advanced sufficiently to allow the pin 77 to drop into the indentation in said cam and allow the lever 69 to operate and withdraw the center 6, Fig. III, also operating the carriage *t*, Fig. IV, thereby disengaging the nut 76 from the smooth portion of the screw *s* at 76^a Fig. III, and engaging the same to the screw *w*, Fig. IV. This screw returns the carriage to the starting point and drops the nut in the same manner as at 76^a. When the center 6 was withdrawn the arbor and shaft fell into the channel guides 65 and rested on the elevator rods 53, Fig. IV. At this time the cams have advanced so that the cam 66, Figs. VI and VIII, allows the pin 78 to fall into the first of two notches in its edge, thereby operating the levers 39 and 37 to disengage the lugs 36^a and 35 and allowing the wheel 23 controlling the eccentric 34 to revolve, whence said wheel proceeds to make one-half revolution and to operate the elevator levers 54, 55, and 57, together with the elevator shafts 53 of Fig. II and thereby lower the record just played into its cradle ends *k k k*, Fig. VI, the record and its arbor passing down through holes in the plate *a a* and base *o* at 80, Fig. IV. The lug 35^a comes around and engages the lug 36 on lever 37, thereby bringing the wheel 23 and the eccentric 34 to a stop. The pin 78 and the lever 39 are at this time being recovered from the bottom of the notch in the cam 66, Figs. VI and VIII, and when recovered fully they have operated on the lever 37 so as to disengage the lug 35^a from the lug 36 and allow it to advance to contact with lug 36^a from which position it is released to perform the latter half of this revolution at the proper time. Immediately with the lugs 35^a and 36^a coming into contact, the pin 79 on lever 43 drops into the notch on cam 67 and thereby releases the mechanism governing the eccentric 34. This eccentric makes one full revolution with the exception of the space between the lugs 41 and 41^a. The eccentric 34 is set on dead center when the lug 40 is midway between the lugs 41 and 41^a, and the resultant travel of the eccentric between the points or lugs 41 and 41^a is so slight as not to be noticed on the levers 47 and 48 or sprocket-wheels *e*. In making this revolution the eccentric 34 operates the levers 47 and 48, Fig. IV, and thereby advances the series of records, thus displacing the record just played, and replacing it with a fresh one in position to be elevated. The pin 79, Fig. VI, is now being recovered from the bottom of the notch in cam 67 and the same results are obtained by lugs 40, 41, and 41^a as were shown by the action of the lugs 35,

35^a, 36, and 36^a. At this time the pin 78 in lever 39 falls into the second notch of the cam 66 and allows the wheel 23 and the eccentric 34 to complete their revolution, thereby elevating a new record to a point between center 6 and chuck 3, Fig. III. At this point the pin 77 in lever 69, Figs. VI and VIII, has commenced to advance out of the notch in cam 68 and thereby operates the levers connecting the bell-crank 10 through the intermediate shaft 8 and block 7, Fig. I, to the center 6, Fig. III, at once pushing the arbor and its shaft into the chuck 3 to operate same and releasing the reproducer so that it comes down and bears on the record.—the nut 76 engaging the screw *s* at the same time. At this instant the pin 78 on lever 39 has advanced and allowed the lug 35 to pass lug 36 and engage with the lug 36^a. The eccentric 34 is set so that this slight motion will advance it sufficiently to operate the elevator shafts slightly, thus withdrawing them downward from the arbor shaft as at 81, Fig. IV, thereby allowing the arbor shaft to rotate freely. It will be noted that the whole cycle of operations has thus been described, and that the displacing of each individual record from its position in the series and the carrying of the same into playing position upon the phonograph, the playing of the record, the replacing of the same in its position in the series, and the advancement of the series so as to bring another record into position to be displaced, involves the repetition of this cycle of operations.

This machine is essentially a coin-operated machine, but may be adapted to be operated by the usual motor and lever for starting and stopping same for home use.

I wish to particularly point out that some of the more important features involved in the operation of my invention and differentiating the same from the prior art as known to me, are as follows: (1) The series of records carried upon the chains *e*, or in the magazine, is advanced through a complete circuit and each record brought back to its original position in said series, during the operation of playing the whole series, each record, however, accordingly as it is played, being entirely displaced from the circular or elliptical path in which the series as a whole moves. (2) The series of records, between the playing of each two contiguous records, is positively advanced a uniform distance by means of the ratchet 50 the levers 47 and 48 and the mechanisms actuating the same and coöperating therewith. (3) The records of the series are uniformly spaced apart in the magazine and fill every position in the complete circuit through which the series moves. (4) The records successively are displaced from the series, carried into playing position upon

the phonograph, and then replaced in the series in the same position from which they were displaced. (5) Cylindrical records, together with their arbors and shafts, are

5 bodily displaced from the series, brought into playing position upon the phonograph, and then replaced in the series.

Having thus described my invention in detail, that which I particularly point out
10 and distinctly claim is:

1. In mechanism of the character described, the combination with a phonograph and suitable actuating mechanisms therefor; of a series of records; means adapted to advance the latter around a complete circuit; and means adapted to displace said records from said circuit into playing position upon said phonograph, and automatically operating mechanism for operating all of said means during a complete circuit of operation.

2. In mechanism of the character described, the combination with a phonograph and suitable actuating mechanisms therefor; of a series of records; means adapted to intermittently advance the latter around a complete circuit; and means adapted to successively displace said records from said circuit into playing position upon said phonograph, and automatically operating mechanism for operating all of said means during a complete circuit of operation.

3. In mechanism of the character described, the combination with a phonograph and suitable actuating mechanisms therefor; of a series of records forming a complete circuit; means adapted to advance said series so that said records occupy successively each position in said circuit; and means adapted to displace said records from said circuit into playing position upon said phonograph, and automatically operating mechanism for operating all of said means during a complete circuit of operation.

4. In mechanism of the character described, the combination with a phonograph and suitable actuating mechanisms therefor; of a series of records forming a complete circuit; means adapted to intermittently advance said series so that said records occupy successively each position in said circuit; and means adapted to displace at a fixed position said records from said circuit into playing position upon said phonograph, and automatically operating mechanism for operating all of said means during a complete circuit of operation.

5. In mechanism of the character described, the combination with a phonograph and suitable actuating mechanisms therefor; of a series of records, the latter positioned so as to fill every position in a complete circuit; means adapted to advance said series as a whole; and means adapted to bring said records into playing position upon said

phonograph, and automatically operating mechanism for operating all of said means during a complete circuit of operation.

6. In mechanism of the character described, the combination with a phonograph and suitable actuating mechanisms therefor; of a series of records so disposed that each two adjacent records are spaced apart uniformly, the whole forming a complete circuit; means adapted to advance said series; and means adapted to bring said records into playing position upon said phonograph, and automatically operating mechanism for operating all of said means during a complete circuit of operation.

7. In automatically-operating mechanism of the character described, the combination with a phonograph and suitable actuating mechanisms therefor; of a series of records so disposed that each two adjacent records are spaced apart uniformly, the whole forming a complete circuit; means adapted to intermittently advance said series as a whole; and means adapted to bring said records into playing position upon said phonograph, and automatically operating mechanism for operating all of said means during a complete circuit of operation.

8. In mechanism of the character described, the combination with a phonograph and suitable actuating mechanisms therefor; of a series of records so disposed that each two adjacent records are spaced apart uniformly, the whole forming a complete circuit; means adapted to advance said series; and means adapted to displace said records from said circuit into playing position upon said phonograph, and automatically operating mechanism for operating all of said means during a complete circuit of operation.

9. In automatically-operating mechanism of the character described, the combination with a phonograph and suitable actuating mechanisms therefor; of a series of record arbors; positive means adapted to advance said series as a whole; and means adapted to bring said record arbors into playing position upon said phonograph.

10. In automatically-operating mechanism of the character described, the combination with a phonograph and suitable actuating mechanisms therefor; of a series of record arbors; means for moving said phonograph and said series relatively to each other, whereby, during a complete relative movement, each record arbor lies adjacent to the said phonograph; and means adapted to displace said record arbors from the path traveled during such relative movement, into playing position upon said phonograph.

11. In automatically operating mechanism of the character described, the combination with a phonograph and suitable actuating mechanism therefor; of a series of record

arbors; means for intermittently moving said phonograph and said series relatively to each other, whereby, during a complete relative movement, each record arbor lies adjacent to said phonograph; and means adapted to successively displace said record arbors from the path traveled during such relative movement into playing position upon said phonograph.

12. In automatically-operating mechanism of the character described, the combination with a phonograph and suitable actuating mechanisms therefor; of a series of record arbors; means for moving said phonograph and said record arbors relatively to each other, whereby, during a complete relative movement, each record arbor lies adjacent to said phonograph; and means for producing a relative movement of said phonograph and each record arbor, accordingly as the former and each successive record arbor, lie adjacent to each other, whereby the record arbor is brought into playing position upon said phonograph, said last-named movement being independent of the path traveled during the relative of said phonograph and said series.

13. In automatically-operating mechanism of the character described, the combination with a phonograph and suitable actuating mechanisms therefor; of a series of record arbors; and means adapted to displace each record-arbor from said series into playing position upon said phonograph, and to replace the same into position in the said series.

14. In automatically-operating mechanism of the character described, the combination with a phonograph and suitable actuating mechanisms therefor; of a series of record arbors; means intermediate, adapted to intermittently advance said series; and means adapted to displace at a fixed position each record arbor from said series into playing position upon said phonograph, and to replace the same in the same place in said series.

15. In automatically-operating mechanism of the character described, the combination with a phonograph and suitable actuating mechanisms therefor; of a series of record arbors; means adapted to place said record arbors into a playing position upon said phonograph and to displace the same therefrom; and means adapted to advance said series, whereby each record arbor, during one complete movement of the series, occupies every position in the series, the movement of the record arbors onto and from the phonograph not forming a part of said complete movement.

16. In automatically-operating mechanism of the character described, the combination with a phonograph and suitable actuating mechanism therefor; of a series of cylindrical records provided with suitable arbors

and shafts; means for moving said series; and means adapted to bodily displace said records and their arbors and shafts from their positions in said series into playing position upon said phonograph.

17. In automatically-operating mechanism of the character described, the combination with a phonograph and suitable actuating mechanisms therefor; of a series of cylindrical records provided with suitable arbors and shafts; positive means for moving said series as a whole; and means adapted to bodily displace said records and their arbors and shafts from their positions in said series into playing position upon said phonograph.

18. In automatically-operating mechanism of the character described, the combination with a phonograph and suitable actuating mechanisms therefor; of a series of cylindrical records provided with suitable arbors and shafts; positive means for moving said series as a whole; and means adapted to bodily displace said records and their arbors and shafts from their positions in said series into playing position upon said phonograph, said moving means and said displacing means performing their functions alternately.

19. In automatically-operating mechanism of the character described, the combination with a phonograph and suitable actuating mechanisms therefor; of a series of cylindrical records provided with suitable arbors and shafts; positive means for moving said series intermittently; and means adapted to bodily displace said records and their arbors and shafts from their positions in said series into playing position upon said phonograph, and to replace the same in said series, one record being displaced and one record replaced between each two movements of said series.

20. In automatically-operating mechanism of the character described, the combination with a phonograph and suitable actuating mechanisms therefor; of a series of cylindrical records provided with suitable arbors and shafts; positive means for moving said series intermittently; and means adapted to bodily displace said records and their arbors and shafts from their positions in said series into playing position upon said phonograph, and to replace the same in said series, one and the same record being displaced and replaced between each two movements of said series.

21. In automatically-operating mechanism of the character described, the combination with a phonograph and suitable actuating mechanisms therefor; of a series of cylindrical records provided with suitable arbors and shafts; means for moving said series around a complete circuit; and means adapted to bodily displace said records and

their arbors and shafts from said circuit into playing position upon said phonograph.

22. In automatically-operating mechanism of the character described, the combination with a phonograph and suitable actuating mechanisms therefor; of a series of cylindrical records provided with suitable arbors and shafts; means for intermittently moving said series; and means adapted to bodily displace said records and their arbors and shafts from a fixed position in said series into playing position upon said phonograph, and to replace the same in said series in the same position.

23. In mechanism of the character described, the combination with a phonograph and suitable actuating mechanisms therefor; of a series of records; means adapted to intermittently advance the same by uniform distances around a complete circuit; and means adapted to move said records into playing position upon said phonograph and automatically operating mechanism for operating all of said means during a complete circuit of operation.

24. In mechanism of the character described, the combination with a phonograph and suitable actuating mechanisms therefor; of a series of records; means adapted to intermittently advance the same by uniform distances around a complete circuit; and means adapted to move said records into playing position upon said phonograph, such last-named movement being independent of said circuit and automatically operating mechanism for operating all of said means during a complete circuit of operation.

25. In automatically-operating mechanism of the character described, the combination with a phonograph and suitable actuating mechanisms therefor; of a base for said phonograph; a series of record arbors; means supported by said base and adapted to carry said record arbors; means adapted to intermittently advance said carrying means; an elevator having an operative movement between said carrying means and the playing position of the record arbors upon the phonograph and adapted to contact with said record arbors; and means for actuating said elevator.

26. In automatically-operating mechanism of the character described, the combination with a phonograph and suitable actuating mechanisms therefor; of a base for said phonograph; a frame supported by said base; a series of record arbors; carrying means for the latter supported by the said frame; means adapted to intermittently advance said carrying means; an elevator having an operative movement between said carrying means and the playing position of the record arbors upon the phonograph, and adapted to contact with said record arbors to elevate the same to and lower the same

from said playing position between each two movements of said carrying means; and means for actuating said elevator.

27. In automatically-operating mechanism of the character described, the combination with a phonograph and suitable actuating mechanisms therefor: of a base for said phonograph; a frame supported by said base; a series of record arbors; carrying means for the latter comprising a pair of shafts journaled in said frame, suitable sprocket-wheels supported upon said shafts, and chain-engaging said sprocket-wheels and having record arbor-supporting means; means adapted to intermittently rotate said sprocket-wheels; an elevator having an operative movement between the playing position of the record arbors upon said phonograph and said carrying means, and adapted to contact with said record arbors to elevate the same to and lower the same from said playing position between each two movements of said sprocket-wheels; and means for actuating said elevator.

28. In automatically-operating mechanism of the character described, the combination with a phonograph: of means for driving same; a base for said phonograph; a frame supported on said base; a series of record arbors; means supported by said frame and adapted to carry said series of record arbors; means adapted to intermittently advance said carrying means; an elevator having an operative movement between said phonograph and said series of record arbors and adapted to contact with the latter successively; means adapted to actuate said elevator intermittently; and gearing connecting said latter means and said phonograph driving means.

29. In automatically-operating mechanism of the character described, the combination with a phonograph; of means for driving the same; a base for said phonograph; a frame supported by said base; a series of record arbors; means supported by said frame and adapted to carry said series of record arbors; means adapted to intermittently advance said carrying means; an elevator having an operative movement between the playing position of the record arbors upon said phonograph and a fixed position upon said frame, and adapted to successively contact with said record arbors at said fixed position; a shaft supported by said base; means operatively connecting said shaft and said phonograph driving means; a clock spring actuated mechanism carried by said shaft; an eccentric operated by said mechanism; and levers and links connected to said eccentric and said elevator to actuate the latter between each two movements of said carrying means.

30. In automatically-operating mechanism of the character described, the combination

with a phonograph; of a driving shaft therefor; a series of records; means adapted to automatically bring said records successively into position between centers upon said phonograph; and means adapted to move a record so positioned into rotative engagement with said driving shaft.

31. In automatically-operating mechanism of the character described, the combination with a phonograph; of a driving shaft therefor; a chuck operatively connected to said driving shaft; a series of records; means adapted to elevate said records successively into position between centers upon said phonograph; and means adapted to move a record so positioned into rotative engagement with said chuck.

32. In automatically-operating mechanism of the character described, the combination with a phonograph; of a driving shaft therefor; an extended bearing; a chuck operatively connected to said driving shaft in said bearing; a series of records having suitable arbors and shafts; means adapted to elevate said records successively into position between centers upon said phonograph; and means adapted to move the arbor and shaft of a record so positioned into rotative engagement with said chuck.

33. In automatically-operating mechanism of the character described, the combination with a phonograph; of a driving shaft therefor; a series of records; means adapted to automatically bring said records successively into position between centers upon said phonograph and to displace the same therefrom; and means adapted to move a record so positioned between centers into rotative engagement with said driving shaft and to release the same therefrom.

34. In automatically-operating mechanism of the character described, the combination with a phonograph; of a driving shaft therefor; an extended bearing; a chuck operatively connected to said driving shaft within said bearing; a series of records having suitable arbors and shafts; means adapted to automatically bring said records successively into position between centers upon said phonograph and to displace the same therefrom; and means adapted to move the arbor and shaft of a record so positioned between centers into rotative engagement with said chuck and to release the same therefrom.

35. In automatically-operating mechanism of the character described, the combination with a phonograph; of a driving shaft therefor; a chuck operatively connected to said driving shaft; a series of records; means adapted to elevate said records successively into position between centers upon said phonograph; means adapted to move a record so positioned into rotative engagement with said chuck; and means adapted

to withdraw said elevating means from contact with the record after said engagement, so that said shaft may freely rotate.

36. In automatically-operating mechanism of the character described, the combination with a phonograph; of means for actuating the latter; a base for said phonograph; a frame supported by said base; a series of records; means supported by said frame and adapted to carry said series of records; an elevator adapted to contact with said records and having an operative movement between said carrying means and the playing position of the records upon the phonograph; means for intermittently actuating said elevator; a shaft supported by said base; gearing operatively relating said shaft to the phonograph; a clock-spring-actuated mechanism adapted to rotate upon said shaft; an eccentric operatively related to said mechanism; and levers and links operatively related to said eccentric and the aforementioned record-carrying means, and adapted to cause said record-carrying means to be actuated intermittently between each two movements of said elevator mechanism.

37. In automatically-operating mechanism of the character described the combination with a phonograph; of a main driving shaft therefor; a base for said phonograph; a frame supported by said base; a series of records; carrying means for the latter supported by said frame; means adapted to intermittently advance said carrying means; an elevator adapted to contact with said records and having an operative movement between said carrying means and the playing position of the records upon the phonograph; a second shaft; gearing connecting said latter shaft to said main shaft; a clock-spring-actuated mechanism operatively connected to said elevator and adapted to rotate on said second shaft, said clock-spring being adapted as an intermediate connection between said rotative mechanism and said shaft and serving to accumulate power caused by the rotation of said shaft; a smaller semi-rotative shaft and levers thereon; a cam adapted to said clock-spring shaft and rotated thereby; means intermediate of and adapted to cause said levers and smaller shaft to act against said cam and thus cooperate with said clock-spring mechanism to cause said rotative mechanism to be released and thereby rotate intermittently as controlled by said cam.

38. In automatically-operating mechanism of the character described, the combination with a phonograph; of a base therefor; a frame supported by said base; a series of records; means supported by said frame and adapted to carry said series of records; means adapted to intermittently advance said carrying means; a shaft supported by

said base; means operatively relating said phonograph and said shaft and adapted to drive the latter; a clock-spring-actuated mechanism carried by said shaft; means operated by said mechanism and adapted to bring said records successively into position upon said phonograph; a governor mounted upon said base; and a train of gearing attached to said mechanism, driven thereby, and operative to actuate said governor, the latter serving to impede the motion of said clock-spring mechanism.

39. In automatically-operating mechanism of the character described, the combination with a phonograph and suitable actuating mechanisms therefor; of a series of records; a pair of channel guides; and means coöperating with the said actuating mechanisms and adapted to displace each record in the series, guide the same into position on the said phonograph by said channel guides, and to replace the same in said series.

40. In automatically-operating mechanism of the character described, the combination with a phonograph; and suitable actuating mechanisms therefor; of centers for said phonograph; a base for the latter; a frame supported by said base; a series of records provided with suitable arbors and shafts; carrying means for the latter, supported by said frame; means adapted to intermittently advance said carrying means; an elevator adapted to bring a record from said series into position between centers upon said phonograph; means adapted to intermit-

tently operate said elevator; a shaft; gearing operatively connecting said phonograph and said shaft and adapted to drive the latter; a cam attached to said shaft; and levers and intermediates operatively related to said cam and to one of the phonograph centers, the construction being such as to cause said center to move forward at the proper time and thus engage the record arbor and force it into position to be rotated.

41. In automatically-operating mechanism of the character described, the combination with a phonograph and suitable coöperating mechanisms; of a supporting frame; a main driving-shaft; a series of records; means adapted to carry the latter; an elevator having a path of movement between said carrying means and the playing position of said records upon said phonograph and adapted to contact with a record and remove the same from said carrying means; a second shaft operatively connected with said main shaft; three cams actuated by said second shaft; and actuating mechanisms connected intermediately of said cams, respectively, and said carrying means, said elevator, and the coöperating mechanisms of said phonograph, respectively.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

J. I. GEMMILL.

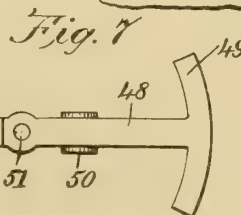
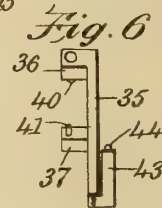
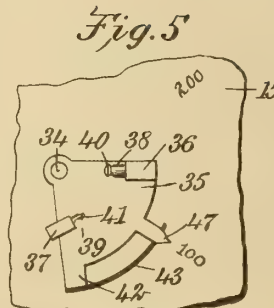
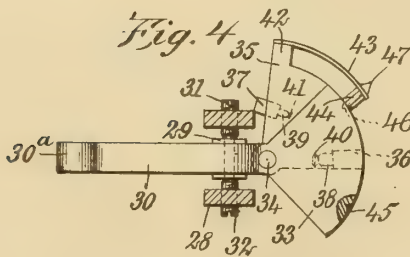
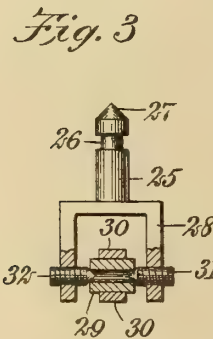
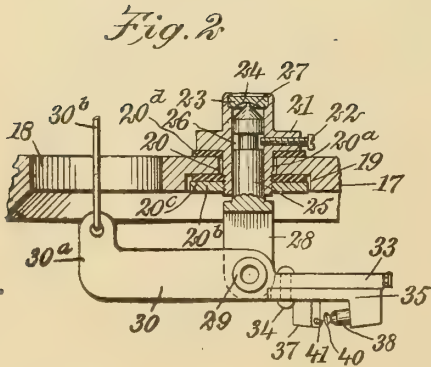
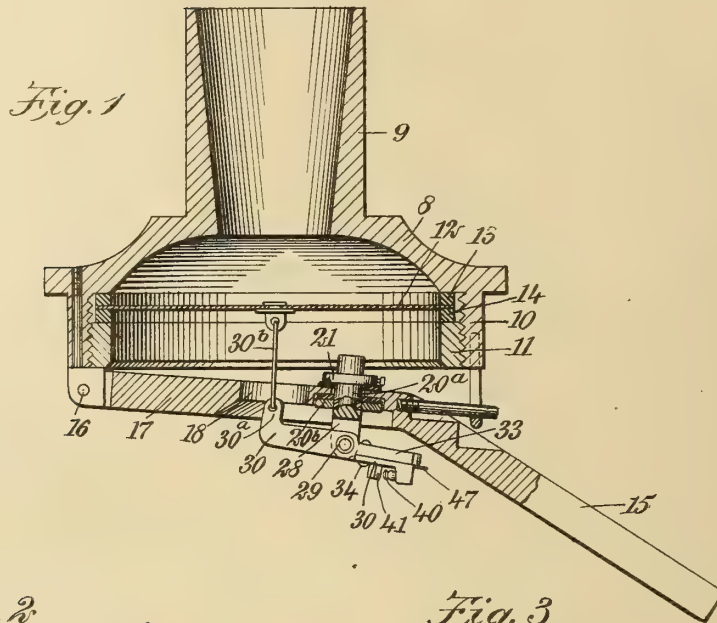
Witnesses:

LEOTA M. GEMMILL,
MARY DRISCOLL.

R. B. SMITH.
SOUND REPRODUCER.
APPLICATION FILED JAN. 11, 1909.

925,846.

Patented June 22, 1909.



WITNESSES
F. T. Sweet
Walton Harrison.

INVENTOR
Richard B. Smith
BY *Mum Co.*
ATTORNEYS

UNITED STATES PATENT OFFICE.

RICHARD BARTHOLOMEW SMITH, OF NEW YORK, N. Y.

SOUND-REPRODUCER.

No. 925,846.

Specification of Letters Patent.

Patented June 22, 1909.

Application filed January 11, 1909. Serial No. 471,768.

To all whom it may concern:

Be it known that I, RICHARD BARTHOLOMEW SMITH, a subject of the King of Great Britain, and a resident of the city of New York, borough of Manhattan, in the county and State of New York, have invented a new and Improved Sound-Reproducer, of which the following is a full, clear, and exact description.

My invention relates to sound reproducers, my more particular purposes being as follows: I, to increase the sensitiveness of the stylus lever as regards its movement toward and from the general position occupied by the diaphragm; II, to increase the sensitiveness of the stylus lever as regards its pivotal movement in a direction approximately parallel with the diaphragm; III, to facilitate the ready interchange of different jewels or other record points, so that by the simple action of a movable part one of these jewels or points may be instantly substituted for another; IV, to reduce the friction of the various parts supporting the stylus lever; V, to provide a stylus lever with a plurality of jewels or other record points, and to enable the same to be used independently; VI, to provide an indicator for disclosing which particular jewel or other record point is in proper position to be used; VII, to enable the same stylus lever to be played with various records having different types of sound grooves, by merely throwing one jewel or record point out of service and another one into service, both jewels or points being permanently carried by the stylus lever; VIII, to provide various details of construction looking toward the general improvement of the reproducer.

Reference is to be had to the accompanying drawings forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 is a substantially central section through a reproducer provided with my various improvements; Fig. 2 is an enlarged fragmentary section through the swivel joint for supporting the stylus lever; Fig. 3 is a view partly in section and partly in elevation, showing the swivel for supporting the stylus lever; Fig. 4 is a fragmentary section

showing the stylus lever and the means carried by it for supporting a plurality of jewels or other record points; Fig. 5 is a fragmentary inverted plan showing the under side of the weight and a portion of the stylus lever carried thereby; Fig. 6 is a side elevation showing the point carrier removed from the stylus lever; and Fig. 7 is a plan view of another form of stylus lever.

A dome 8 is provided with a neck 9 and with a cylindrical portion 10, the dome and cylindrical portion together comprising a casing. A diaphragm is shown at 12 and is engaged by rings 13, 14 of resilient material. At 15 is a weight which is mounted upon a pivot 16 and is provided with a flat portion 17 having the form of a disk and having a central hole 18 directly through it. The disk 17 is further provided with an aperture 19 and with a hole 20 which merges into this aperture. A tubular sleeve 20^a is threaded at its lower end and fitted with a nut 20^b which engages a washer 20^c. The tubular sleeve 20^a is provided with an annular flange 21 and extending into the latter and adjustable relatively to the same is a screw 22. The annular flange 21 engages a washer 20^d. The washers 20^c, 20^d are made of leather, soft rubber or the like and serve as cushions. The upper end of the tubular sleeve 20^a is provided with a bearing 23 having generally the form of a disk and provided with a concave bearing surface 24.

A swivel stem 25 is provided with an annular slot 26 and is further provided with a conical end 27, this conical end being preferably made of hardened steel. The conical end engages directly the concave face 24. The lower end of the swivel stem 25 is fashioned into a fork 28 and this fork supports a bearing sleeve 29. Mounted rigidly upon this bearing sleeve is a stylus lever 30 which is provided with an upturned portion 30^a, the stylus lever thus having generally an L-shaped form. A link 30^b engages the upturned end 30^a and is connected with the diaphragm 12. Conical pointed screws 31, 32 extend through the fork 28 and into the ends of the bearing sleeve 29. By this arrangement the stylus lever 30 is very delicately poised, and consequently quite sensitive. The ends of the bearing sleeve 29

merely touch the conical pointed screws 31, 32, as indicated in Fig. 3, so that the stylus lever has comparatively little lost motion relative to the screws 31, 32.

5 The stylus lever 30 is provided with a tail piece 33 integral with it and having generally the form of a sector, as indicated in Fig. 4. Mounted upon the stylus lever 30 and co-axial with the sector 33 is a pivot 34 which
10 supports a movable sector 35. This movable sector carries sleeves 36, 37, and mounted within the latter are jewel holders 38, 39 provided with jewels or record points 40, 41, which may be of different sizes and otherwise
15 of different character. For instance, the member 40 may be a sapphire, whereas the member 41 may be a tantalum point. The sector 35 is further provided with a lug 42 and mounted upon the latter is a leaf spring
20 43 having generally an arcuate form. This leaf spring at its outer or free end carries a lug 44 which extends toward the adjacent edge of the sector 33 and is adapted to slip into either of the bowl-shaped openings 45,
25 46, so as to hold the movable sector 35 temporarily in fixed position relatively to the sector 33.

An indicating needle 47 is mounted rigidly upon the sector 35 and may be used for turning
30 the same upon the pivot 34. The needle 47 has thus a general arcuate path of travel, and disposed adjacent to this path of travel are legends 100, 200 (see Fig. 5). When the parts are in such position that the needle 47
35 is directed toward the legend 100 the jewel or record point 40 is in position to engage a record, and when the needle 47 is adjacent to the legend 200 the point or record 41 is similarly in position for engaging the record.

40 Since, as above indicated, the jewel or record point 40 may be a sapphire, it may be employed in connection with a record having say 100 threads to the inch, the smaller jewel
45 having say 200 threads to the inch. By shifting the jewels or record points, which is done by simply turning the sector 35 and adjusting the needle 47 relatively to the legends 100 or 200, I am thereby enabled to
50 present the kind of jewel or record point suitable for use with one kind of record having a large number of threads per inch, and by merely turning the sector 35 I can present
55 another jewel or record point suitable for use with a record of a different kind and having a smaller number of threads to the inch. Hence, in taking off a record of one kind and putting on a record of another kind, I merely turn the sector 35.

60 In Fig. 7 I show another form of stylus lever 48. The latter is provided at its outer end with a sector 49 integral with it and having generally an arcuate form. The stylus lever 48 is provided with a bearing

sleeve 50 and also with a pivot 51 for sup- 65 porting a sector similar to the sector 35 but larger than the latter.

The construction shown in Fig. 5 differs from that shown in Fig. 4 mainly in the relative positions of the pivots 34, 51, as com- 70 pared with the bearing sleeves 29, 50. In Fig. 4 the pivot 34 is intermediate the sector 33 and the bearing sleeve 29, whereas in Fig. 7 the bearing sleeve 50 is intermediate the pivot 51 and the sector 49. In other respects 75 the stylus lever shown in Fig. 4 is similar to that shown in Fig. 7.

If it should happen that the sector 35 is a little difficult to turn relative to the sector 33, the stylus lever 30, by swinging freely upon 80 its vertical axis, causes the upturned portion 30^a to engage the weight 18, and this renders the stylus needle sufficiently rigid for the moment to enable the operator to turn the sector 35. In other words, the inner 85 surface of the hole 18 serves as a limiting stop for preventing excessive rotary travel of the stylus lever 30. I have found that the upturned portion 30^a (see Fig. 2) gives the stylus lever 30 a considerable advan- 90 tage. The link 30^b, by pulling upwardly upon the end of the upturned portion 30^a at the time when the jewel or record point 40 is in engagement with a record, renders positive the motion of the stylus lever 30 95 and prevents lost motion in this lever. I have found that the best results take place when the action between the link 30^b and the upturned portion 30^a takes place at a point slightly below an imaginary line ex- 100 tending from the jewel or record point 40, and also through the axis of the bearing sleeve 29, as will be understood from Fig. 2, the point of connection in question, however, being above the upper edge of the stylus 105 lever 30.

The conical point 27 of the pivot stem 29, engaging, as it does, the bearing face 24 at the geometrical center of the same and being of hardened steel, offers a minimum of fric- 110 tion as regards the turning of the swivel stem 25. This stem is not readily lost or removed from the sleeve 20^a, for the reason that the screw 22 normally holds it in proximate position. The outer surface of the 115 swivel stem 25 and the inner surface of the bearing sleeve 20^a are exceedingly smooth, so as to offer a minimum of friction. The wearing plate 23 prevents entrance of dirt or grit beneath the bearing plate 23, and the delicate bearings contained within the bearing sleeve 20^a are thus thoroughly protected.

The purpose of the washers 20^c, 20^d, serving as cushions, is to improve the quality of the sounds reproduced and to avoid the so- 125 called "scratching", which is so objectionable in machines of this character. As the weight 15ⁱ is to a great extent free while the

machine is in action, there is more or less tendency for this weight to be set in motion by the sound vibrations. The weight has an especial tendency to receive vibratory motions from the stylus lever and thus to not only set up false sounds by the weight acting to some extent like a diaphragm, but also in doing this, to absorb the power of the stylus needle.

10 In turning the sector 35 upon the pivot 34 there is more or less unavoidable tendency to turn the lever 30 upon the axis of the swivel stem 25 as a center. Since, however, the upturned portion 38 of the stylus lever
15 extends into the hole 18, and since any rotation of the stylus lever upon the swivel stem 25 of the center causes the link 30^b to incline and thus draw the upturned portion 38 slightly upward, it necessarily follows that
20 the upturned portion 38 engages the inner wall of the flat plate 17 so that the hole 18 limits the possible travel of the stylus lever. This arrangement is very convenient for the reason that the operator in turning the sector
25 35 might accidentally throw a considerable strain upon the diaphragm 12 except for the fact that undue rotation of the stylus lever is thus limited by the size of the hole 18.

The washers 20^c, 20^d effectively cut off, as
30 far as practicable, all rigid mechanical communication between the weight 15 and the stylus lever 30, so that the vibrations of this lever are not absorbed by the weight, but are transmitted directly to the diaphragm, and
35 any accidental motion which may influence the weight is not transmitted to the diaphragm. The net result is that this arrangement greatly reduces the scratching and improves the quality and purity of the tones.
40 The sounds reproduced are therefore much more natural.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:

45 1. The combination of a weight, a stylus lever mounted thereupon and free to rock and also to turn, said stylus lever being provided with an upturned portion, a link connected with said upturned portion for the
50 purpose of rendering positive the motions of said stylus lever, and means for supporting a jewel upon a portion of said stylus lever opposite said upturned portion.

2. A sound reproducer, comprising a
55 weight, a bearing sleeve mounted upon the same, a swivel stem extending into said bearing sleeve and provided with a conical point, and a bearing plate secured within said bearing sleeve and provided with a sur-
60 fact to be engaged by said point, and a stylus lever supported by aid of said swivel stem.

3. In a sound reproducer, the combination of a supporting member provided with a hole extending through it, a bearing sleeve ex-

tending into said hole, means for securing
65 said bearing sleeve rigidly in relation to said supporting member, a screw extending into said bearing sleeve, a swivel stem extending into said bearing sleeve and adapted to be engaged by said screw for the purpose of pre-
70 venting the removal of said swivel stem from said bearing sleeve, and a stylus lever connected with said swivel stem and supported thereby.

4. A sound reproducer, comprising a
75 stylus lever, a swivel stem connected therewith and provided with a conical point, a bearing surface connected with said bearing sleeve and engaging said conical point, and means for normally preventing the removal
80 of said swivel stem from said bearing sleeve.

5. In a sound reproducer, the combination of a stylus lever, a bearing sleeve connected therewith, said bearing sleeve having open
85 ends, conical pointed members extending into said open ends, and means for supporting said conical pointed members.

6. In a sound reproducer, the combination of a stylus lever, a bearing sleeve extending directly through the same and having gen-
90 erally a tubular form, a fork having portions disposed upon opposite sides of said stylus lever, and conical ended screws extending through said portions of said fork and into
95 opposite ends of said bearing sleeve.

7. A device of the character described, comprising a stylus lever provided with a
tail piece flattened out and having substantially the form of a sector, said sector being provided with openings disposed upon its
100 peripheral edge, a second sector movable relatively to said first-mentioned sector and pivotally mounted upon said stylus lever, means for turning said second-mentioned sector, a locking member carried by said
105 second-mentioned sector and provided with a portion for entering said openings in order to lock said sectors rigidly in relation to each other, and jewels carried by said second-mentioned sector and disposed upon differ-
110 ent portions thereof.

8. A device of the character described, comprising a stylus lever, a bearing sleeve for supporting the same, a sector carried by
said stylus lever and immovable relatively to
115 the same, and another sector carried by said stylus lever and movable relatively to the latter, the movable sector being connected with said stylus lever by aid of a pivot disposed intermediate said bearing sleeve and
120 the outer edges of said sectors.

9. In a sound reproducer, a stylus lever provided with a sector having generally an arcuate form, and further provided with a bearing sleeve and with a pivot, said bearing
125 sleeve being disposed intermediate said pivot and said sector.

10. In a sound reproducer, the combina-

merely touch the conical pointed screws 31, 32, as indicated in Fig. 3, so that the stylus lever has comparatively little lost motion relative to the screws 31, 32.

5 The stylus lever 30 is provided with a tail piece 33 integral with it and having generally the form of a sector, as indicated in Fig. 4. Mounted upon the stylus lever 30 and co-axial with the sector 33 is a pivot 34 which
10 supports a movable sector 35. This movable sector carries sleeves 36, 37, and mounted within the latter are jewel holders 38, 39 provided with jewels or record points 40, 41, which may be of different sizes and otherwise
15 of different character. For instance, the member 40 may be a sapphire, whereas the member 41 may be a tantalum point. The sector 35 is further provided with a lug 42 and mounted upon the latter is a leaf spring
20 43 having generally an arcuate form. This leaf spring at its outer or free end carries a lug 44 which extends toward the adjacent edge of the sector 33 and is adapted to slip into either of the bowl-shaped openings 45,
25 46, so as to hold the movable sector 35 temporarily in fixed position relative to the sector 33.

An indicating needle 47 is mounted rigidly upon the sector 35 and may be used for turning
30 the same upon the pivot 34. The needle 47 has thus a general arcuate path of travel, and disposed adjacent to this path of travel are legends 100, 200 (see Fig. 5). When the parts are in such position that the needle 47
35 is directed toward the legend 100 the jewel or record point 40 is in position to engage a record, and when the needle 47 is adjacent to the legend 200 the point or record 41 is similarly in position for engaging the record.

40 Since, as above indicated, the jewel or record point 40 may be a sapphire, it may be employed in connection with a record having say 100 threads to the inch, the smaller jewel or record point 41 being suitable for records
45 having say 200 threads to the inch. By shifting the jewels or record points, which is done by simply turning the sector 35 and adjusting the needle 47 relatively to the legends 100 or 200, I am thereby enabled to
50 present the kind of jewel or record point suitable for use with one kind of record having a large number of threads per inch, and by merely turning the sector 35 I can present
55 another jewel or record point suitable for use with a record of a different kind and having a smaller number of threads to the inch. Hence, in taking off a record of one kind and putting on a record of another kind, I merely turn the sector 35.

60 In Fig. 7 I show another form of stylus lever 48. The latter is provided at its outer end with a sector 49 integral with it and having generally an arcuate form. The stylus lever 48 is provided with a bearing

sleeve 50 and also with a pivot 51 for supporting a sector similar to the sector 35 but larger than the latter.

The construction shown in Fig. 5 differs from that shown in Fig. 4 mainly in the relative positions of the pivots 34, 51, as compared with the bearing sleeves 29, 50. In
70 Fig. 4 the pivot 34 is intermediate the sector 33 and the bearing sleeve 29, whereas in Fig. 7 the bearing sleeve 50 is intermediate the pivot 51 and the sector 49. In other respects
75 the stylus lever shown in Fig. 4 is similar to that shown in Fig. 7.

If it should happen that the sector 35 is a little difficult to turn relative to the sector 33, the stylus lever 30, by swinging freely upon
80 its vertical axis, causes the upturned portion 30^a to engage the weight 18, and this renders the stylus needle sufficiently rigid for the moment to enable the operator to turn the sector 35. In other words, the inner
85 surface of the hole 18 serves as a limiting stop for preventing excessive rotary travel of the stylus lever 30. I have found that the upturned portion 30^a (see Fig. 2) gives the stylus lever 30 a considerable advantage.
90 The link 30^b, by pulling upwardly upon the end of the upturned portion 30^a at the time when the jewel or record point 40 is in engagement with a record, renders positive the motion of the stylus lever 30
95 and prevents lost motion in this lever. I have found that the best results take place when the action between the link 30^b and the upturned portion 30^a takes place at a point slightly below an imaginary line extending from the jewel or record point 40,
100 and also through the axis of the bearing sleeve 29, as will be understood from Fig. 2, the point of connection in question, however, being above the upper edge of the stylus
105 lever 30.

The conical point 27 of the pivot stem 29, engaging, as it does, the bearing face 24 at the geometrical center of the same and being of hardened steel, offers a minimum of friction
110 as regards the turning of the swivel stem 25. This stem is not readily lost or removed from the sleeve 20^a, for the reason that the screw 22 normally holds it in proximate position. The outer surface of the
115 swivel stem 25 and the inner surface of the bearing sleeve 20^a are exceedingly smooth, so as to offer a minimum of friction. The wearing plate 23 prevents entrance of dirt or grit beneath the bearing plate 23, and the
120 delicate bearings contained within the bearing sleeve 20^a are thus thoroughly protected.

The purpose of the washers 20^c, 20^d, serving as cushions, is to improve the quality of the sounds reproduced and to avoid the so-called "scratching", which is so objectionable in machines of this character. As the weight 15ⁱ is to a great extent free while the

machine is in action, there is more or less tendency for this weight to be set in motion by the sound vibrations. The weight has an especial tendency to receive vibratory motions from the stylus lever and thus to not only set up false sounds by the weight acting to some extent like a diaphragm, but also in doing this, to absorb the power of the stylus needle.

10 In turning the sector 35 upon the pivot 34 there is more or less unavoidable tendency to turn the lever 30 upon the axis of the swivel stem 25 as a center. Since, however, the upturned portion 38 of the stylus lever
15 extends into the hole 18, and since any rotation of the stylus lever upon the swivel stem 25 of the center causes the link 30^b to incline and thus draw the upturned portion 38 slightly upward, it necessarily follows that
20 the upturned portion 38 engages the inner wall of the flat plate 17 so that the hole 18 limits the possible travel of the stylus lever. This arrangement is very convenient for the reason that the operator in turning the sector
25 35 might accidentally throw a considerable strain upon the diaphragm 12 except for the fact that undue rotation of the stylus lever is thus limited by the size of the hole 18.

The washers 20^c, 20^d effectively cut off, as
30 far as practicable, all rigid mechanical communication between the weight 15 and the stylus lever 30, so that the vibrations of this lever are not absorbed by the weight, but are transmitted directly to the diaphragm, and
35 any accidental motion which may influence the weight is not transmitted to the diaphragm. The net result is that this arrangement greatly reduces the scratching and improves the quality and purity of the tones.
40 The sounds reproduced are therefore much more natural.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:

45 1. The combination of a weight, a stylus lever mounted thereupon and free to rock and also to turn, said stylus lever being provided with an upturned portion, a link connected with said upturned portion for the
50 purpose of rendering positive the motions of said stylus lever, and means for supporting a jewel upon a portion of said stylus lever opposite said upturned portion.

2. A sound reproducer, comprising a
55 weight, a bearing sleeve mounted upon the same, a swivel stem extending into said bearing sleeve and provided with a conical point, and a bearing plate secured within said bearing sleeve and provided with a sur-
60 fact to be engaged by said point, and a stylus lever supported by aid of said swivel stem.

3. In a sound reproducer, the combination of a supporting member provided with a hole extending through it, a bearing sleeve ex-

tending into said hole, means for securing 65 said bearing sleeve rigidly in relation to said supporting member, a screw extending into said bearing sleeve, a swivel stem extending into said bearing sleeve and adapted to be engaged by said screw for the purpose of pre- 70 venting the removal of said swivel stem from said bearing sleeve, and a stylus lever connected with said swivel stem and supported thereby.

4. A sound reproducer, comprising a 75 stylus lever, a swivel stem connected therewith and provided with a conical point, a bearing surface connected with said bearing sleeve and engaging said conical point, and means for normally preventing the removal 80 of said swivel stem from said bearing sleeve.

5. In a sound reproducer, the combination of a stylus lever, a bearing sleeve connected therewith, said bearing sleeve having open ends, conical pointed members extending 85 into said open ends, and means for supporting said conical pointed members.

6. In a sound reproducer, the combination of a stylus lever, a bearing sleeve extending directly through the same and having gen- 90 erally a tubular form, a fork having portions disposed upon opposite sides of said stylus lever, and conical ended screws extending through said portions of said fork and into opposite ends of said bearing sleeve. 95

7. A device of the character described, comprising a stylus lever provided with a tail piece flattened out and having substan- tially the form of a sector, said sector being provided with openings disposed upon its 100 peripheral edge, a second sector movable relatively to said first-mentioned sector and pivotally mounted upon said stylus lever, means for turning said second-mentioned sector, a locking member carried by said 105 second-mentioned sector and provided with a portion for entering said openings in order to lock said sectors rigidly in relation to each other, and jewels carried by said second-mentioned sector and disposed upon differ- 110 ent portions thereof.

8. A device of the character described, comprising a stylus lever, a bearing sleeve for supporting the same, a sector carried by said stylus lever and immovable relatively to 115 the same, and another sector carried by said stylus lever and movable relatively to the latter, the movable sector being connected with said stylus lever by aid of a pivot dis- posed intermediate said bearing sleeve and 120 the outer edges of said sectors.

9. In a sound reproducer, a stylus lever provided with a sector having generally an arcuate form, and further provided with a bearing sleeve and with a pivot, said bearing 125 sleeve being disposed intermediate said pivot and said sector.

10. In a sound reproducer, the combina-

tion of a diaphragm, a stylus lever for actuating the same, a weight for pressing said stylus lever toward the sound record, and a cushion disposed intermediate said weight and said stylus lever for the purpose of deadening the travel of sound vibrations therebetween.

11. In a sound reproducer, the combination of a weight, a stylus lever journaled upon said weight, and a cushion engaging said stylus lever and said weight for the purpose of preventing said weight from affecting the sound vibrations of said stylus lever.

12. The combination of a weight, a stylus lever journaled thereupon, and a washer of sound deadening material engaging said weight for the purpose of preventing undesirable motions thereof from affecting movements of said stylus lever.

13. In a sound reproducer, the combination of a weight, a sleeve connected therewith, sound deadening material disposed intermediate said weight and said sleeve for the purpose of destroying vibrations, a supporting member journaled within said sleeve, and a stylus lever journaled upon said supporting member.

14. The combination of a stylus lever, a stem for supporting the same, a sleeve engaging said stem and serving as a bearing therefor, a supporting member for holding said sleeve, and a cushion disposed intermediate said supporting member and said sleeve for the purpose of preventing the travel of sound vibrations therebetween.

15. The combination of a stylus lever, a bearing upon which said stylus lever is journaled, a sector mounted upon said stylus lever and adapted to turn relatively thereto, said sector extending outwardly away from said bearing, and a member mounted upon said sector for the purpose of engaging a sound record.

16. The combination of a stylus lever, a bearing upon which said stylus lever is journaled, a sector mounted upon said stylus lever and adapted to turn relatively thereto, said sector extending outwardly away from said bearing, and a plurality of record points mounted upon said sector and adapted to be brought one at a time into a predetermined position.

17. In a sound reproducer, the combination of a stylus lever, a support therefor, a sector revolvably mounted upon said stylus lever and adapted to turn upon an axis, said sector extending outwardly away from said support for said stylus lever, and a record point mounted upon said sector.

18. The combination of a stylus lever mounted to rock upon an axis, a member mounted upon said stylus lever and adapted to be turned into different positions relatively thereto, said member extending in a general

direction outwardly away from said axis upon which said stylus lever is mounted, and a plurality of record points mounted upon different parts of said movable member and adapted to be brought one at a time into positions opposite to said axis from the center of rotation of said sector.

19. The combination of a stylus lever mounted to rock upon an axis, a member movably mounted upon said stylus lever and extending in a general direction toward said axis, said member being adapted to be turned angularly into different positions, a plurality of record points mounted upon said member and adapted to be brought one at a time to a position opposite the axis of said stylus lever from the support of said member, and means for locking said member in different positions relatively to said stylus lever.

20. The combination of a diaphragm, a stylus lever in operative relation to the same, a stem upon which said stylus lever is journaled, a weight for supporting said stem, a cushion mounted upon said weight, and mechanism disposed intermediate said cushion and said stem for deadening sound vibrations.

21. The combination of a stylus lever, means for connecting the same with a diaphragm, a movable member mounted upon said stylus lever and adapted to turn in a plane crossing the plane in which said stylus lever normally rocks, record points mounted upon said movable member, and indicating marks for enabling the operator to determine the positions of said record points relatively to said stylus lever.

22. The combination of a stylus lever provided with a sector fixed in relation thereto, a movable sector disposed adjacent to said fixed sector, means for securing said movable sector rigidly in relation to said fixed sector, and a plurality of record points mounted upon said movable sector.

23. The combination of a stylus lever provided with an upturned portion, a supporting member upon which said stylus lever is journaled, so as to rock in two planes crossing each other, said supporting member being provided with an opening into which said upturned portion extends for the purpose of preventing said stylus lever from turning beyond certain limits in one of said planes, a diaphragm, and means for transmitting motion from said upturned end of said stylus lever to said diaphragm.

24. The combination of a weight provided with a central opening, a stylus lever journaled upon said weight and adapted to turn in a plane substantially parallel with the general plane of said weight, said stylus lever being provided with an upturned portion extending into said opening so that said weight serves as a limiting stop for preventing ex-

cessive travel of said stylus lever when thus turning, a diaphragm, and means for transmitting motion from said upturned portion of said stylus lever to said diaphragm.

- 5 25. The combination of a weight, a stylus lever journaled thereupon and adapted to turn, a sector journaled upon said stylus lever and adapted to turn upon a center independently of the axis of rotation of said stylus lever, and means for preventing excessive travel of said stylus lever relatively to said

weight when said sector is turned by hand, and a record point mounted upon said sector and adapted to be brought into a predetermined position by the rotation of said sector. 15

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

RICHARD BARTHOLOMEW SMITH.

Witnesses:

WALTON HARRISON,
EVERARD B. MARSHALL.



E. P. SHEPARD.
SOUND MODIFIER FOR TALKING MACHINES.
APPLICATION FILED DEC. 30, 1908.

925,958.

Patented June 22, 1909.

Fig. 1.

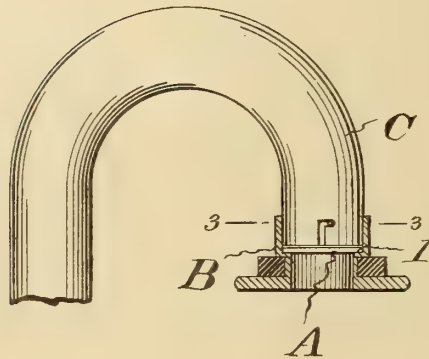


Fig. 2.

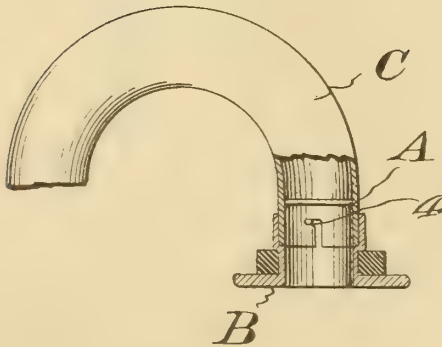


Fig. 3.

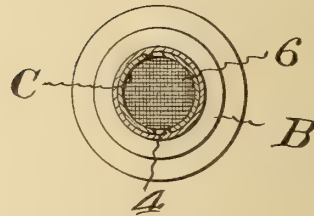


Fig. 5.

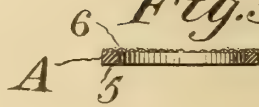
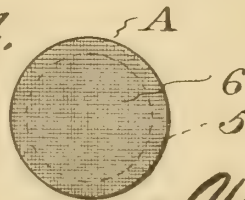


Fig. 4.



Witnesses:
J. P. Mahler
C. Bradway.

Inventor
Edward P. Shepard
By Victor J. Evans.
Attorney

UNITED STATES PATENT OFFICE.

EDWARD P. SHEPARD, OF SAN DIEGO, CALIFORNIA.

SOUND-MODIFIER FOR TALKING-MACHINES.

No. 925,958.

Specification of Letters Patent.

Patented June 22, 1909.

Application filed December 30, 1908. Serial No. 470,021.

To all whom it may concern:

Be it known that I, EDWARD P. SHEPARD, a citizen of the United States, residing at San Diego, in the county of San Diego and State of California, have invented new and useful Improvements in Sound-Modifiers for Talking-Machines, of which the following is a specification.

This invention relates to a device designed for use in connection with gramophones and other talking machines whereby the sound can be effectively modified or reduced without, however, producing any detrimental muffling effect.

The invention has for one of its objects to improve and simplify the construction of devices of this character so as to be comparatively simple and inexpensive to manufacture, reliable and efficient in use, and so designed as to be in the nature of an attachment which can be readily applied to machines in common use.

Another object of the invention is the provision of a sound-modifying device consisting of a resilient or elastic ring adapted to fit within the gooseneck of the machine or in the sleeve connecting the sounding box with the gooseneck, and secured to this ring and stretched across the same is a diaphragm of suitable material or fabric such as silk which allows the sound waves to readily pass with the effect that the sound will be reduced in an effective manner.

With these objects in view and others, as will appear as the description proceeds, the invention comprises the various novel features of construction and arrangement of parts which will be more fully described hereinafter and set forth with particularity in the claims appended hereto.

In the accompanying drawing, which illustrates one embodiment of the invention, Figure 1, is a fragmentary view of the goose-neck of a talking machine showing the attachment arranged in the sounding box of the goose neck, said sound box being shown in section. Fig. 2 is a detail sectional view showing the attachment located within the goose-neck at a point inwardly from the box. Fig. 3 is a transverse section on line

3—3, Fig. 1. Fig. 4 is a plan view of the attachment. Fig. 5 is a diametrical sectional view thereof.

Similar reference characters are employed to designate corresponding parts throughout the views.

Referring to the drawing, A designates the sound-modifying attachment which may be located within the part or sleeve B by which the sounding box is attached to the goose-neck C or within an equivalent part of the talking machine, the attachment being positioned between the annular shoulder 1 of the said part B and the extremity of the goose-neck. If desired, however, the sound-modifying attachment can be located within the goose-neck C as shown in Fig. 2, at a point above the bayonet joint 4 that detachably connects the said part B with the goose-neck.

The sound-modifying attachment preferably consists of a ring 5 of rubber or other suitable elastic material and of such diameter as to snugly fit in the goose-neck or part B. This ring constitutes a support or a body for a diaphragm 6 of any suitable fabric such, for instance, as silk which serves to reduce or modify the sound. This diaphragm of silk is glued, cemented or otherwise suitably secured to the supporting ring.

From the foregoing description, taken in connection with the accompanying drawing, the advantages of the construction and of the method of operation will be readily apparent to those skilled in the art to which the invention appertains, and while I have described the principle of operation of the invention, together with the device which I now consider to be the best embodiment thereof, I desire to have it understood that the device shown is merely illustrative, and that such changes may be made when desired as are within the scope of the claims appended hereto.

Having thus described the invention, what I claim is:

1. A sound modifying attachment for talking machine consisting of an annular elastic body adapted to be frictionally held in place in the machine by its own resiliency.

and a diaphragm of fabric stretched across the opening of the body and secured fixedly to the latter.

2. A sound-modifying attachment for talking machines comprising a rubber ring, and a diaphragm of silk stretched across the ring and secured to the said ring.

In testimony whereof I affix my signature in presence of two witnesses.

EDWARD P. SHEPARD.

Witnesses:

JOHN N. NEWKIRK,
A. T. MACFARLAND.

P. B. T. BERNER.

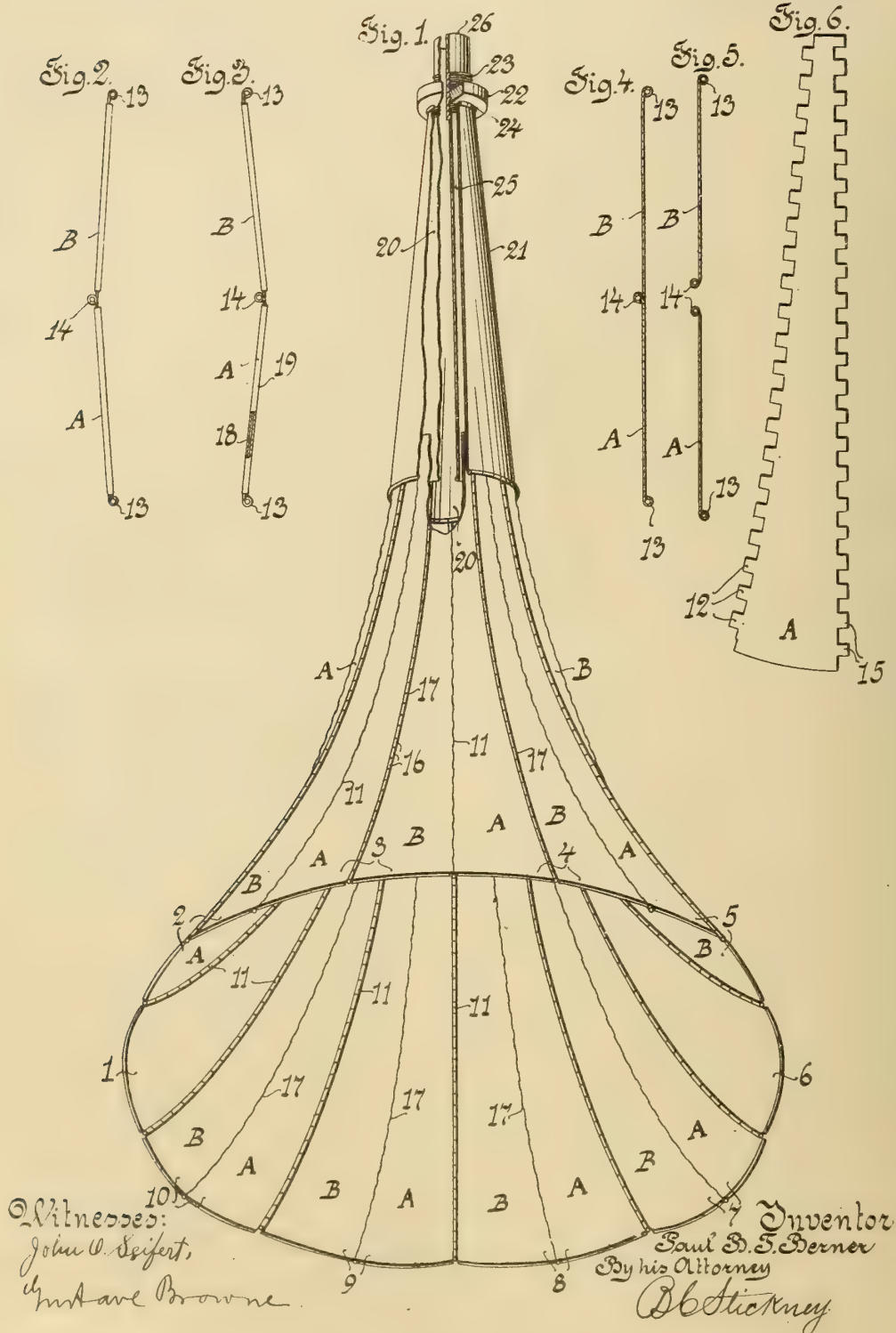
PHONOGRAPH HORN.

APPLICATION FILED AUG. 19, 1907.

926,235.

Patented June 29, 1909.

3 SHEETS—SHEET 1.

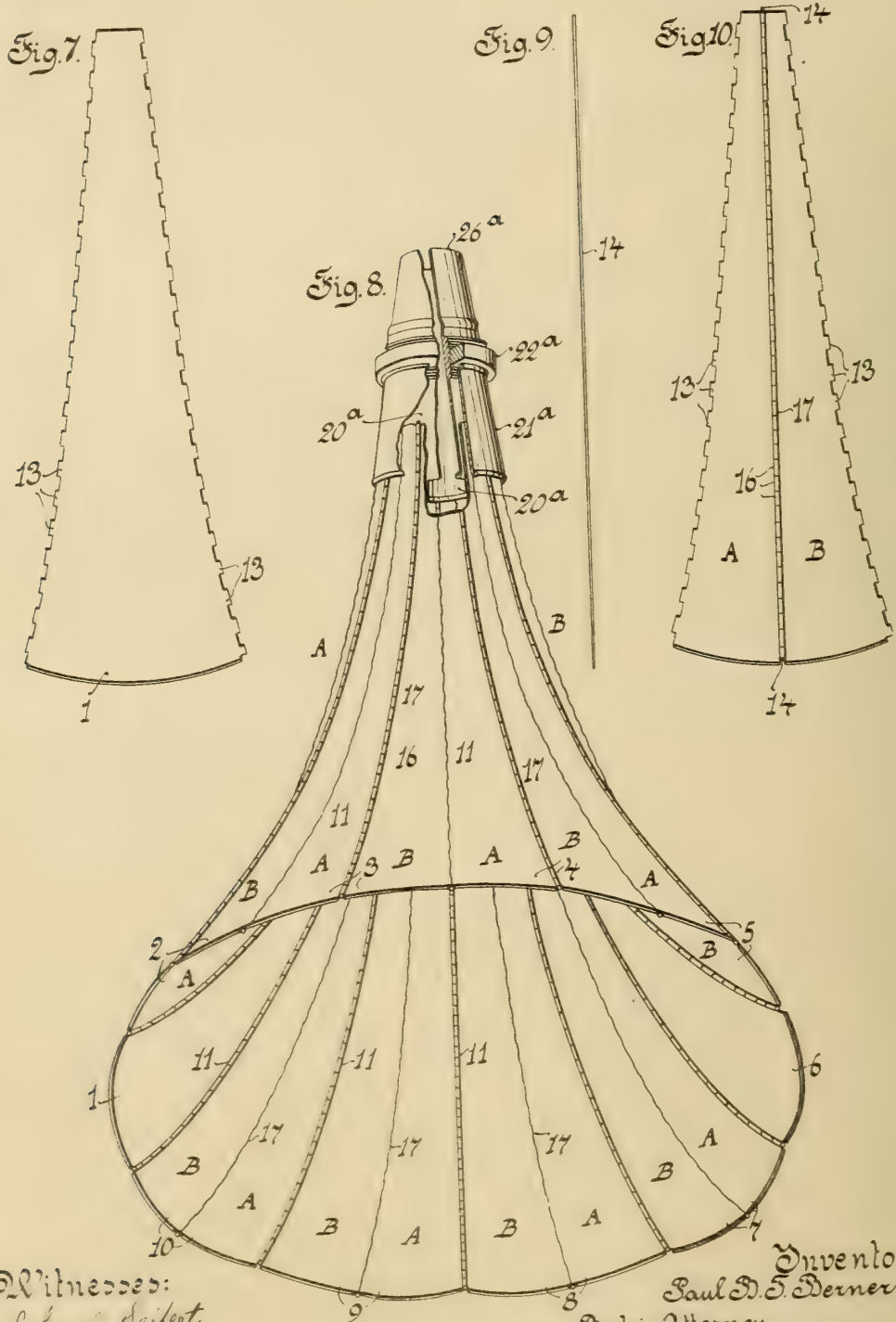


Witnesses:
John C. Seifert,
Arthur Browne.

Inventor
Paul D. T. Berner
By his Attorney
O. H. Hickney



926,235.



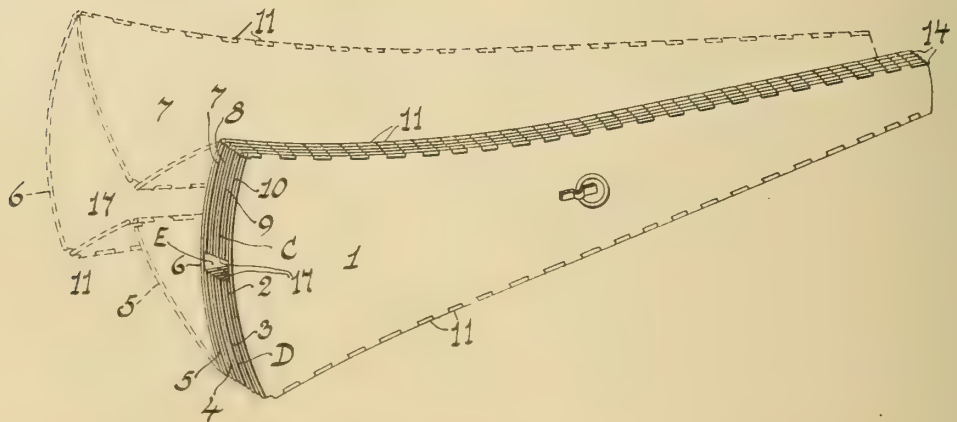
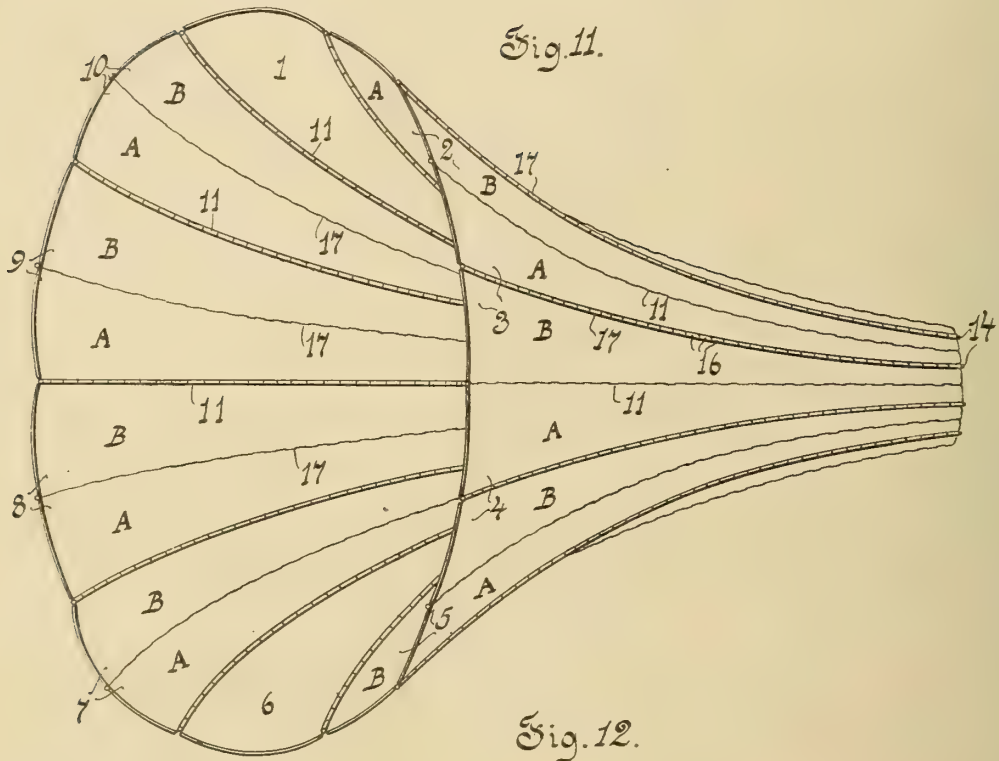
Witnesses:
 John S. Seifert.
 Myrae Brown.

Inventor
 Paul D. S. Berner
 By his Attorney
 O. C. Stickney

926,235.

Patented June 29, 1909.

3 SHEETS—SHEET 3.



Witnesses:
 John O. Seifert.
 Michael Browne.

Inventor
 Paul B. T. Berner
 By his Attorney
 B. B. Stickney

UNITED STATES PATENT OFFICE.

PAUL B. T. BERNER, OF NEW YORK, N. Y., ASSIGNOR TO SEARCHLIGHT HORN COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

PHONOGRAPH-HORN.

No. 926,235.

Specification of Letters Patent.

Patented June 29, 1909.

Application filed August 19, 1907. Serial No. 389,188.

To all whom it may concern:

Be it known that I, PAUL B. T. BERNER, a citizen of the United States, residing in the borough of Brooklyn, city of New York, in the county of Kings and State of New York, have invented certain new and useful Improvements in Phonograph-Horns, of which the following is a specification.

This invention relates to phonograph horns and like instruments, the bells of which are usually built up of a series of sections, the latter generally having curved side edges which give the desired contour to the bell; and in certain respects it is in the nature of an improvement on the horns shown in United States Patents 12,442 of January 30, 1906, and 771,441 of October 4, 1904.

One of the principal objects of my invention is to simplify the construction and reduce the cost of the built-up bell of a phonograph horn. To this end, I make the sections of thin flexible sheet metal, usually with curved side edges, and join said curved edges together by means of wires passing through a series of eyes rolled or formed alternately in the contiguous sections. This method of joining the strips together is very simple and inexpensive.

A further object of the invention is to produce a horn which is capable of being folded or reduced in bulk for convenience in transportation or storage.

In carrying out this feature of the invention, I preferably form certain or all of said sections of two strips each as hereinafter described. This permits the strips to fold together in the manner of the plaits of a fan, so that all the strips can pack facewise against each other, thereby reducing the bulk to a minimum. In setting up the horn it is only necessary to expand the bell, which, owing largely to the outward buckling of the large ends of the strips, possesses sufficient rigidity for use.

Preferably each of two sections in the horn is single, that is, formed of a single metal plate instead of being formed of two strips hinged together. These single plates or sections are placed opposite each other in the horn, so that when the same is folded, the strips or plaits form two sets which lie one

opposite the other between said single sections, so that the device very closely resembles a folded fan in form.

It will be understood that if the bell is not intended to be collapsible, all of the sections may be single instead of formed each of a pair of strips hinged together; the novel method of hinging the sections together even in a non-collapsible horn being preferable to methods heretofore in vogue.

The neck of the bell, whether collapsible or not, may be provided with any suitable funnel or means to connect the same to a phonograph as hereinafter described.

In the following I have described, in connection with the accompanying drawings, one form of device illustrating the carrying out of my invention.

In the accompanying drawings, Figure 1 is a view of a phonograph horn embodying my several improvements in one form; parts being broken away to disclose the invention more clearly. Figs. 2 and 3 are end views of a bell section, comprising two strips hinged together, and illustrates the buckling or springing of the strips when opening the bell. Fig. 4 is a sectional view to illustrate the hinging of the strips which form a bell section. Fig. 5 shows the Fig. 4 strips separated. Fig. 6 is a blank of one of the strips which make up the bell sections. Fig. 7 is one of the single or main sections of the bell, undivided into strips. Fig. 8 is a view of another construction of device for clamping the neck of a bell. Fig. 9 shows one of the wires which form the plaits to connect the strips and sections together. Fig. 10 is a view of two strips hinged together to form a section. Fig. 11 is a view of a detached opened bell. Fig. 12 shows the bell folded in full lines, and also shows by dotted lines the manner of unfolding the same.

Similar letters and numerals of reference indicate similar parts throughout the several views.

The bell, which in this instance has the popular flower contour, is illustrated as made up of ten tapering flexible sheet metal sections, which have curved side edges to give the proper contour to the bell, and are

numbered from 1 to 10 inclusive. These sections are each permanently hinged to both adjoining sections, as at 11, said hinges 11 being on the inside of the horn and connecting said curved side edges. Along each of said side edges are originally stamped in each plate a succession of tongues 12, which are then bent, curled or rolled to form eyes 13, the eyes along one curved edge alternating with those along the contiguous curved edge and fitting therebetween, so that the eyes are all coincident or co-axial, as seen at 11, Fig. 1. Connection is then effected by means of a wire 14, thus joining each couple of sections together by means of a continuous hinge. By making each eye wholly on one side of the section, as seen best at Figs. 4 and 5, tight joints are produced, so that little, if any, light can be seen through the hinges, thus conducing to the excellence of the acoustic properties of the horn. It will be understood that the wires 14, considered either alone or in connection with the eyes 13, constitute stiffening ribs at the joints of the bell. This, furthermore, is a very substantial and durable method of connecting the sections and forming the bell, and may be resorted to even in cases where it is not desired to produce a foldable bell; and in such a case, the joints may be additionally stiffened by the use of a little solder, if desired, and the eyes may be on the outside instead of on the inside of the bell; and each of the sections may be in the form of a single or integral plate, as seen at Fig. 7.

One method of forming a collapsible horn consists in dividing each of the said sections into two strips, which are hinged together in the manner already described. A pair of such strips marked A and B is seen at Fig. 10. A blank for making such strips is seen at Fig. 6; tongues 15 being formed on the right hand side edge at said figure, which tongues are bent to form eyes 16. These eyes are connected by a wire 14, thereby forming a hinge similar to the hinge 11, with the exception that this hinge, marked 17, is straight as at Fig. 10, when the bell is folded, and that the hinge is on the outside of the bell, Fig. 1. Each of the strips A, B, therefore, has one straight side edge, along which edge the strips are joined to form a pair, such pair corresponding in dimensions to one of the sections above mentioned. The outer side edge of each strip diverges from the inner side edge from the neck to the mouth of the bell, Fig. 10.

The horn may be folded in the form seen in full lines at Fig. 12, by simply turning the strips upon the hinges alternately in and out in the manner of the plaits of a common fan, eight of the sections, or sixteen of said strips being treated in this manner, whereby two sets of strips or plaits, marked

respectively C and D, are folded and packed facewise together, one set opposite the other set. Preferably, sections 1 and 6 are undivided or formed each in a single integral piece or plate, as shown, so that the sets of plaits C and D fold compactly between the sections 1 and 6, the rigidity of the latter sections being of value in making a comparatively stable package of the folded bell. Preferably, said sections 1 and 6 are made each a little wider than the remaining sections, so as to leave a clearance E between the sets of plaits C and D. This package, at Fig. 12 it will be seen, has minimum dimensions, being of a length equal to the length of the bell, and of a width equal to the width of one section, and of a thickness equal to the thickness of ten sections, so that it can be packed conveniently with a phonograph for shipment, and can be conveniently transported or stored by the user.

In opening the bell, from the Fig. 12 position to the Fig. 11 position, when the same is nearly open, each pair of strips is sprung outwardly from the Fig. 3 to the Fig. 2 position, near its outer edge, this characteristic of springing or buckling being due to the curvature of the outer side edge of each strip, where one section joins the next; and it contributes to the stiffness of the bell. It will be understood that the hinge wires 14 in the joints 17 are straight in the Fig. 12 position, but are flexed outwardly when the bell is opened; and it will also be understood that the strips A and B should be relatively narrow and long, as the use of a relatively large number in building up the bell renders it more convenient to fold and open the same.

It will be perceived that all of the strips are permanently connected, so that the structure is continuous, and for ordinary purposes inseparable at any point, whether open as at Figs. 1 and 11, or closed as at Fig. 12, so that in opening or closing, it is only necessary to unfold or fold as the case may be, without the necessity of manually joining or disjoining any of the sections. This form of joint between the sections is valuable, because undue springing or tensioning of the metal in forming seams, as heretofore generally practiced, is avoided, and hence the bell delivers the sounds more clearly than in prior horns of this type. At its outer end, each of the strips or sections is rolled over a wire 18 as seen at 19, Fig. 3, thus to stiffen the bell and protect said edge from injury.

In assembling the horn, after the bell is opened, I preferably insert a funnel or tapering tube 20, whose large end fits closely within the tapering neck of the bell. Over this funnel, I place a second funnel 21, which fits over said bell neck; and a nut 22 is turned upon a threaded projecting portion 23 of the inner funnel, and bears up

against the end 24 of the outer funnel to force the same up over the bell neck, and simultaneously draw the funnel 20 outwardly within said neck. The funnel 21 tends to wedge the neck inwardly while the funnel 20 tends to wedge the neck outwardly, and as a result the neck is firmly clamped between said funnels, thus producing a rigid and substantial phonograph horn. An air space 25 is formed between said funnels, and tends to avoid faulty acoustic action. A nipple 26 is formed on the inner funnel beyond the threaded part 23.

At Fig. 8 is shown a form of funnel or tip for a bell adapted to another style of phonograph from the Fig. 1 construction. In this case, the tip 26^a is tapering, and the funnel 20^a is relatively short, while the outer funnel 21^a is so short as to be little more than a ferrule to bind the neck of the horn against the inner funnel; this being accomplished by a nut 22^a of relatively large diameter.

Variations may be resorted to within the scope of the invention, and portions of the improvements may be used without others.

Having thus described my invention, I claim:

1. A flaring-mouth and approximately circular bell forming part of a phonograph horn, comprising a series of flexible sheet metal strips joined edge to edge by means of metal hinges, the latter consisting of ears formed on the strips and wire pintles passing through the ears, and means to stiffen the small end of the bell.

2. An approximately circular bell forming part of a phonograph horn, comprising a series of metal strips, every one of which is permanently connected by means of movable joints to both of the adjoining strips, the joints and strips sufficiently flexible to permit the bell to flare at its mouth, and means to stiffen the small end of the bell.

3. A collapsible bell for a phonograph horn comprising a series of strips connected together at their side edges by hinged joints, said joints folding inwardly and outwardly alternately.

4. A collapsible bell for a phonograph horn comprising a series of strips connected together at their side edges by hinged joints, two of said strips being wider than the remainder and separated from each other by other strips arranged in pairs, the jointed edges of which latter fold inwardly and outwardly alternately.

5. A collapsible bell for a phonograph horn comprising a series of strips connected together at their side edges by hinged joints, said strips being arranged in pairs, the inner edges of the strips in each pair being straight and the outer edges of the strips in each pair being curved, the hinged joints of said straight edges folding inwardly and those of the curved edges folding outwardly.

6. A collapsible bell for a phonograph horn comprising a series of strips connected together by hinged joints, at least one of said strips being broader than the others and the remainder of said strips being arranged in pairs, the hinged joints of which latter fold inwardly and outwardly alternately.

7. A collapsible bell for a phonograph horn comprising a series of strips connected together by hinged joints, some of said strips being arranged in pairs, the hinged joints between the strips being alternately on the inside and the outside of the bell.

8. A collapsible bell for a phonograph horn comprising a series of strips connected together at their side edges by hinged joints, two of said strips being wider than the remainder, provided with curved edges and diametrically disposed with reference to each other and the intervening strips being arranged in pairs, the inner edges of the strips in each pair being straight, and the outer edges in each pair being curved, whereby the paired strips when collapsed form two groups of plaits intermediate the broader strips.

9. A collapsible bell for a phonograph horn, comprising in its collapsed condition two sections, each having curved side edges, said sections being connected by means of two sets of relatively narrow strips, the strips in each set being connected to one another and to the outside sections by means of hinges.

10. A collapsible bell for a phonograph horn, comprising in its collapsed condition two sections, each having curved side edges, said sections being connected by means of two sets of relatively narrow strips, the strips in each set being connected to one another and to the outside sections by means of hinges, each narrow strip having an outer curved edge and an inner straight edge.

11. A collapsible bell for a phonograph horn, comprising in its collapsed condition two sections, each having curved side edges, said sections being connected by means of two sets of relatively narrow strips, the strips in each set being connected to one another and to the outside sections by means of hinges, each narrow strip having an outer curved edge and an inner straight edge, the curvature of the outer edges of said strips agreeing with the curvature of the edges of said outside sections.

12. A phonograph horn comprising a series of strips connected together at their side edges by movable joints, said strips arranged in pairs, the inner edges of the strips in each pair being straight, and the outer edges of the strips in each pair being curved to give the desired contour to the bell.

13. A phonograph horn comprising a series of strips connected together at their side edges by movable joints, said strips ar

ranged in pairs, the inner edges of the strips in each pair being straight, and the outer edges of the strips in each pair being curved to give the desired contour to the bell; said

5 bell also comprising a plurality of sections about equal in width to a pair of said strips, and having curved side edges.

14. A phonograph horn comprising a series of strips connected together at their
10 side edges by movable joints, said strips arranged in pairs, the leading edges of the strips in each pair being straight, and the outer edges of the strips in each pair being curved to give the desired contour to the
15 bell; said bell also comprising a plurality of sections about equal in width to a pair of said strips, and having curved side edges, each of which is loosely jointed to one of the outer edges of a pair of said strips.

20 15. A bell for a phonograph horn comprising a series of sheet metal strips, each having a set of hinge eyes formed along each side edge to alternate with the eyes of the adjoining strip, and wires threaded through
25 the eyes to connect the strips.

16. A bell for a phonograph horn comprising a series of sheet metal strips, each having a set of hinge eyes formed along each
30 side edge to alternate with the eyes of the adjoining strip, and wires threaded through the eyes to connect the strips, certain of said side edges being curved, and said wires forming flexible pintles to permit the bell to collapse.

35 17. An approximately circular bell forming part of a phonograph horn comprising a series of sheet metal strips, every one of which is permanently hinged at its side edges to both of the adjoining strips, by
40 means of hinge ears formed upon the strips and flexible pintles passing through the ears, and means to stiffen the small end of the bell.

45 18. An approximately circular bell forming part of a phonograph comprising a series of strips having a succession of eyes formed along each side edge and integral with their respective strips, wires passing through said eyes to join the strips together, and means to stiffen the small end
50 of the bell.

19. A collapsible bell for a phonograph horn comprising strips hinged together at their side edges, and foldable one upon another in the manner of a plaiting, said strips
55 having a straight contour along their inner side edges, and a curved contour along their outer side edges.

20. A collapsible bell for a phonograph horn comprising strips hinged together at
60 their side edges, and foldable one upon another in the manner of a plaiting, said strips having a straight contour along their inner side edges, and a curved contour along their outer side edges, said horn also comprising
65 two broad sections similarly connected to the

strips, each broad section of slightly greater width than a pair of said strips, and the strips being folded in two sets between said broad sections.

21. A collapsible approximately circular
70 bell forming part of a phonograph horn comprising a series of strips, every one of which is connected at its side edges by means of movable joints to both of the adjoining strips in a manner to permit the folding of the horn to pack all the strips face-
75 wise together; said strips and joints so shaped and so flexible as to cause the bell to flare at its mouth, and means to stiffen the small end of the bell.

22. A bell for a phonograph horn comprising two sets of strips, each set comprising four pairs, and two broad sections, the strips in each set hinged each to the next along its side edges, and said sets being opposed to each other and hinged to the side
85 edges of said broad sections.

23. As a new article of manufacture, a series of phonograph horn strips hinged each to the next along their side edges, said
90 strips comprising a number of pairs, the strips in each pair being straight-edged along the joint which unites them, and having their outer side edges curved to form the contour of the horn.

24. As a new article of manufacture, a metal strip to form a plait or section of a phonograph horn, said strip having one side edge straight, and the other side edge curved.

25. As a new article of manufacture, a
100 metal strip to form a plait or section of a phonograph horn, said strip having one side edge straight, and the other side edge curved; tongues being formed along each of said side edges and bent to form eyes to
105 receive a connecting wire.

26. A bell for a phonograph horn comprising strips mounted in pairs, the strips in each pair hinged each to the other along a straight line, the outer edges of the pairs
110 being divergent from each other, and each pair hinged to the next.

27. As a new article of manufacture, a series of phonograph horn strips hinged each to the next along their side edges, said
115 strips comprising a number of pairs, the strips in each pair being straight-edged along the joint which unites them, and having their outer side edges shaped to form the contour of the horn and provided with
120 tongues to receive joining wires.

28. A pair of metal strips joined together to form a section of a phonograph horn, each of said strips having its inner side edge straight, the joint between said strips extending along the median line of said section, and the outer side edges of said strips diverging from each other.

29. As a new article of manufacture, a flexible metal section of a phonograph horn,
130

both side edges curved; tongues being formed along one of said side edges and bent to form eyes to receive a connecting wire.

5 30. As a new article of manufacture, a flexible metal section of a phonograph horn, both side edges curved; tongues being formed along each of said side edges and bent to form eyes to receive a connecting
10 wire.

31. A pair of metal strips joined together to form a section of a phonograph horn, each of said strips having its inner side edge straight, the joint between said strips extending along the median line of said section, and the outer side edges of said strips diverging from each other; and formed with hinge eyes.

32. As a new article of manufacture, a series of phonograph-horn tapering strips of flexible sheet metal formed along their side edges with tongues bent to form eyes, the eyes on each strip alternating with those of the contiguous strip, and wires passing through the eyes to connect the strips together.

33. A flaring-mouth approximately circular bell forming part of a phonograph horn comprising tapering sections of sheet metal, each of said sections having curved side edges, said side edges permanently connected together by means of eyes provided along said curved edges, and wires passing through the eyes.

34. A bell for a phonograph horn comprising tapering sections of sheet metal, each of said sections having curved side edges, said side edges permanently connected together by means of eyes provided along said curved edges, and wires passing through the eyes; certain of said sections consisting each of a pair of strips hinged together at their contiguous edges.

35. A bell for a phonograph horn comprising tapering sections of sheet metal, each of said sections having curved side edges, said side edges permanently connected together by means of eyes provided along said curved edges, and wires passing through the eyes; certain of said sections consisting each of a pair of strips hinged together at their contiguous edges; the section hinges being on the outer side of the horn, and the strip hinges being on the inner side thereof.

36. A phonograph horn comprising a bell, a funnel fitting within the small end of the bell and having a screw thread at its small end, a second funnel inclosing the first funnel and also fitting over the small end of the bell, and a nut upon said threaded portion to bear against the small end of the outer funnel to force the latter up onto the bell and draw the first funnel down within the bell, thereby to clamp the bell between said funnels.

37. A phonograph horn comprising a collapsible bell, an inner detachable ferrule and an outer detachable ferrule for the small end of said bell, and means for causing said ferrules to clamp the bell.

38. A phonograph horn comprising a bell, funnels one within the other and fitting respectively within and without the small end of said bell, and means for effecting relative bell-clamping movement between said funnels.

39. A phonograph horn comprising a bell, funnels one within the other and fitting respectively within and without the small end of said bell, and means for effecting relative endwise bell-clamping movement between said funnels.

40. A phonograph horn comprising a bell having a tapering small end, funnels of corresponding taper and arranged one within the other and fitting respectively within and without said end of the bell, and means for moving one funnel upon the other in a manner to clamp the bell.

41. A phonograph horn comprising a bell having a tapering small end, funnels of corresponding taper and arranged one within the other and fitting respectively within and without said end of the bell, said funnels being relatively movable endwise to clamp the bell between them, and means to secure the funnels in clamping position.

42. An approximately circular phonograph horn comprising a collapsible bell composed of a series of strips connected together at their side edges by hinged joints, said bell having a tapering small end, a funnel fitting said end, and an annular device for stiffening the small end of the bell and securing it to said funnel.

43. A phonograph horn comprising a bell and two funnels one within the other and connected to said bell.

44. A phonograph horn comprising a bell and two funnels one within the other, and connected to said bell; an air-space intervening between said funnels.

45. A phonograph horn comprising a collapsible bell having a tapering neck, a funnel fitting in said neck, and means for moving said neck, and connected to said funnel for drawing the latter down tightly onto said neck.

46. A bell for a phonograph horn comprising a number of flexible sections of sheet metal having curved side edges, connected by metal hinges.

47. A flaring-mouth bell forming part of a phonograph horn and comprising a number of flexible sections of sheet metal having side edges, all of which are permanently connected by metal hinges.

48. A phonograph horn having a collapsible bell comprising a number of flexible strips having jointed side edges, a funnel

inserted within the neck of said bell, and means inclosing said neck to draw said funnel down and clamp the neck thereto.

5 49. A phonograph horn having a bell comprising a number of flexible strips having side edges permanently hinged together, a funnel inserted within the neck of said bell,

a second funnel inclosing said neck, and means for causing said second funnel to clamp said neck.

PAUL B. T. BERNER.

Witnesses:

JOHN O. SEIFERT,

KITTIE FRANKFORT.

W. N. DENNISON.
COMBINED SPEED REGULATOR AND BRAKE.
APPLICATION FILED AUG. 27, 1906.

927,504.

Patented July 13, 1909.

Fig. 1.

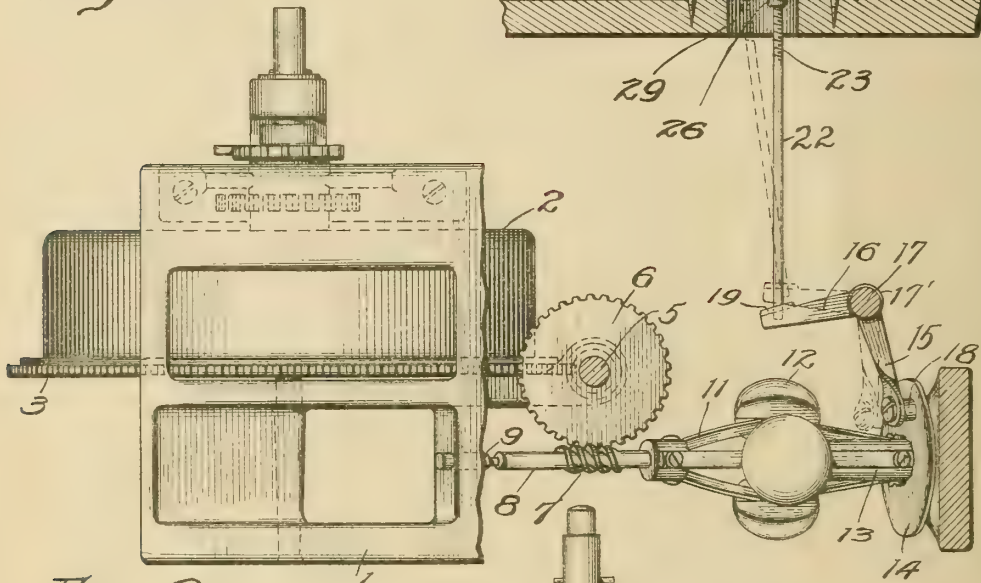


Fig. 2.

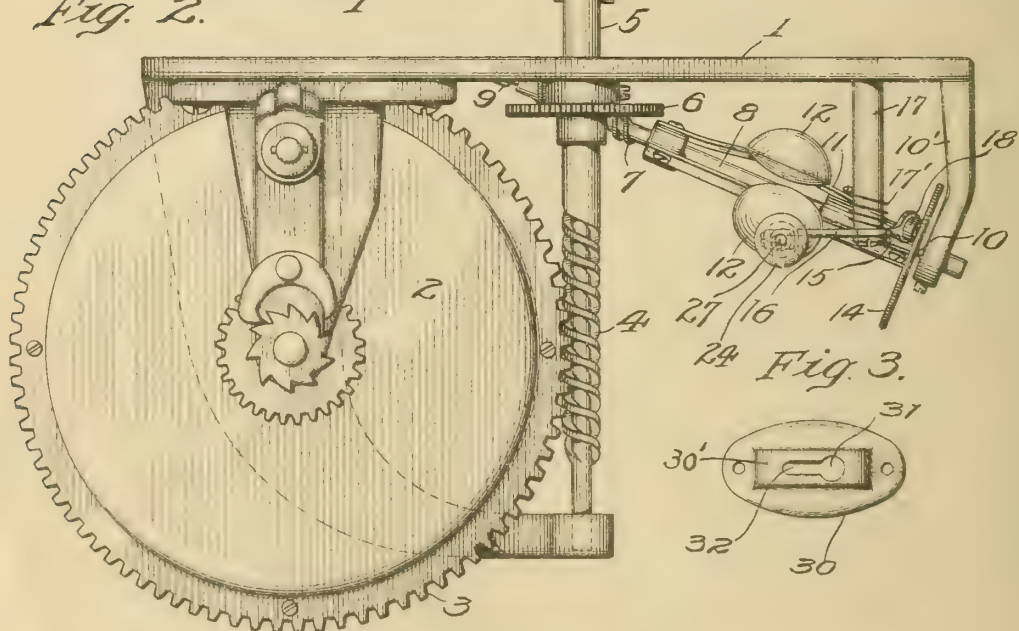


Fig. 3.

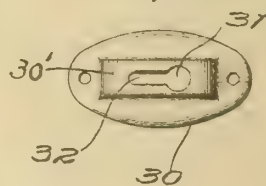
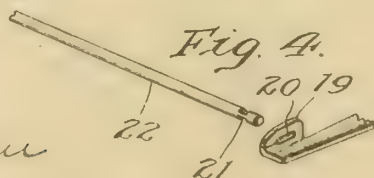


Fig. 4.



WITNESSES:
W. G. Hartman
Walter A. Alden

INVENTOR
Wilburn N. Dennison.
BY *George Pettit*
ATTORNEY.

UNITED STATES PATENT OFFICE.

WILBURN N. DENNISON, OF MERCHANTVILLE, NEW JERSEY, ASSIGNOR TO VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW JERSEY.

COMBINED SPEED REGULATOR AND BRAKE.

No. 927,504.

Specification of Letters Patent.

Patented July 13, 1909.

Application filed August 27, 1906. Serial No. 332,096.

To all whom it may concern:

Be it known that I, WILBURN N. DENNISON, a citizen of the United States, residing at the borough of Merchantville, in the county of Camden and State of New Jersey, have invented certain new and useful Improvements in a Combined Speed Regulator and Brake, of which the following is a full, clear, and complete disclosure, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to speed regulators and brakes, and particularly to that class of the same which are used to regulate the speeds of talking machines.

Talking machines are usually provided with speed regulators, and also with separate speed brakes which are used only in starting and stopping the machines, for while some of the speed regulators in use are capable of acting as a brake to start and to stop the machine, yet these regulators cannot be used for this purpose without changing the adjustment of the regulator which limits the rate of speed of the machine, and when so used it is necessary to readjust the regulator after starting the machine to obtain the desired speed.

The main objects of my invention are to provide a regulator of few parts and simple and inexpensive design and which will be durable and efficient in use; to provide a regulator which may be actuated quickly and conveniently to start or stop the machine and which may be quickly and easily adjusted to limit the speed of the machine to any predetermined rate; to provide a regulator which may be adjusted to limit the speed of the machine to any predetermined rate, and which may also be used as a brake to start and to stop the machine, without disturbing the adjustment which fixes the limit of the rate of speed; and to provide other improvements which will appear in the following specification and claims.

In the accompanying drawings Figure 1 is a top plan view of a talking machine motor having my invention applied thereto, the frame of the motor being broken away and the cabinet being shown in a fragmentary section; Fig. 2 is an elevation of the motor and frame detached from the cabinet; and Figs. 3 and 4 are views of parts of the regulator.

Referring to the drawings, the motor frame 1 has depending therefrom at one side, the motor 2 which drives a worm gear 3 meshing with the worm 4 on the turn table shaft 5, the upper end of which is adapted to receive the turn table of the talking machine.

The motor thus far described may be of any well known type and further description thereof is therefore not necessary.

On the turn table shaft 5 is mounted a worm gear 6 which meshes with a worm 7 on the inclined governor shaft 8, which latter is mounted to rotate in the end bearings 9 and 10. The bearing 9 is secured to the top plate of the frame and the bearing 10 to the lower end of the depending arm 10'. The governor is of the centrifugal type, the governor shaft 8 having the expansible arms 11 carrying the fly balls 12. The outer ends of the arms 11 are mounted upon a collar 13 to which is attached a friction disk 14, the said collar and disk being free to reciprocate on the shaft 8. The opposite ends of the arms 11 are secured to the governor shaft 8, as usual.

To regulate the speed of the governor a bell crank having arms 15 and 16, is mounted to swing on the lower end of a post 17, depending from the top plate of the frame of the motor and the outward movement of the arm 16 and the inward movement of the arm 15 are resisted by the pressure of the spiral spring 17' surrounding the post 17, one end of the spring being fastened to the latter and the other end to the bell crank lever. A friction pad 18, made of felt or any other suitable material, is mounted on the end of the arm 15, which is arranged to bring the pad into and out of engagement with the friction disk. The face of the said disk being transverse to the plane of the main portion of the arm 15, the end of the latter is twisted so as to bring the face of the friction pad substantially parallel to the face of the friction disk. The spring 17' not only normally resists the movement of the friction pad away from the disk but when permitted exerts a pressure of said pad upon the disk sufficient to stop the revolution of the governor. On the free end of the bell crank arm 16 is a laterally extending lug 19, which is split to form a slot 20 in which is loosely mounted the piece 21 of the actuated pin 22, the latter having its outer

or free end screw threaded at 23 and carrying a thumb nut. The thumb nut has a milled head 24, whereby it may be conveniently rotated and a reduced shank 25 having a reduced inner end forming a lug 26. The said nut is split longitudinally at 27 and is expanded upon the pin 22, thus effecting a tight engagement with the screw threaded portion thereof. In the exterior wall 28 of one side of the cabinet is an orifice 29 over which fits a plate 30, struck up upon which is an arc of a circle having a radius. Substantially equal to the effective length of the pin 22, is a raised portion 30' having a circular aperture 31 therein, adapted to receive the lug 26 of the nut, but too small to receive the shank thereof. Extending laterally from the aperture 31 and communicating therewith is an elongated slot 32 adapted to receive the pin 22 but too small in diameter to receive the lug 26 of the nut.

The operation of the device is as follows: Assuming the regulator to be in the position indicated in full lines in the drawing, to start the motor the thumb nut is grasped by the milled head and drawn outwardly until the lug 26 of the nut is withdrawn from the aperture 31, when the nut is then swung laterally carrying the pin through the slot 32, and the nut is then released, whereupon the lug 26 of the nut will be held rigidly against the outer surface of the raised portion 30' of the plate 30, thus locking the pin and lever in the position shown in the dotted lines in Fig. 1. This movement of the nut releases the friction pad from engagement with the friction disk, and the motor, thus released, begins to revolve, the governor shaft carrying the friction disk and fly balls therewith, advancing the friction disk toward the friction pad in proportion to the increase of speed, as usual. When the disk reaches the friction pad 15, in its dotted line position, the disk is held by the pad against further advancement but continues to revolve subject to the resistance of the pad which limits the speed of the disk to a fixed rate.

A variation of the rate of speed of the governor may be accomplished by adjusting the effective length of the pin 22 by rotating the nut upon its threads to change the longitudinal position of the pin, whereby the friction pad will be moved toward or away from the friction disk, thus decreasing or increasing the speed of the disk accordingly. The adjustment of the nut longitudinally of the pin may be made to such an extent as to entirely stop the motor but ordinarily the stopping of the motor is accomplished by the quicker action of the pin and nut together, without rotating the nut, by swinging the nut laterally and permitting the inner reduced end of the shank of the nut to drop into locking engagement in the aperture 31,

as hereinbefore described, and the nut is rotated only when it is desired to change the rate of speed of the governor.

With this construction in mind it is evident that I have provided an extremely simple device which may be adjusted to limit the speed of a talking machine to any predetermined rate by the movement of a single actuating element, and whereby the machine may be started or stopped by the action of the same element without changing the adjustment of that element with respect to the said rate of speed.

Although I have shown only one form in which this invention may be embodied it is obvious that many changes might be made in the construction herein set forth within the scope of the appended claims without departing from the spirit of this invention or sacrificing any of the advantages thereof.

Having thus described my invention, what I claim and desire to protect by Letters-Patent of the United States, is,—

1. In a governor, the combination with a rotatable friction disk, of a brake member to engage said disk, an actuating pin jointed to said member at one end, and means for adjusting the other end of said pin in various positions laterally and longitudinally to control the speed of said disk.

2. In a governor, the combination with a rotatable friction disk, of a brake member mounted to engage said disk, an actuating pin jointed to said member, a nut screw threaded upon said pin, and means for adjusting the nut in various positions laterally to control the speed of said disk.

3. In a governor, the combination with a rotatable friction disk, of a lever pivoted to engage said disk, an actuating pin pivoted to said lever, and means for adjusting said pin in various positions laterally and longitudinally to control the speed of said disk.

4. In a governor, the combination with a rotatable friction disk, of a lever pivoted to engage said disk, an actuating pin pivoted to said lever, a nut screw threaded upon said pin, and means for adjusting the nut in various positions laterally to control the speed of said disk.

5. In a governor, the combination with a rotatable friction disk, of a lever pivoted to engage said disk, an actuating pin jointed to said lever, a nut screw threaded upon said pin, the inner end of said nut being of smaller diameter than the outer end of said nut, and a plate provided with an aperture arranged and adapted to receive the smaller end of said nut and having a slot extending laterally from said aperture to receive said pin.

6. In a governor, the combination with a rotatable friction disk, of a lever pivoted to engage said disk, an actuating pin jointed to said lever, a nut screw threaded upon said pin, the inner end of said nut being of smaller

diameter than the outer end of said nut, and a plate provided with an aperture arranged and adapted to receive the smaller end of said nut and having a slot extending laterally from said aperture to receive said pin, said plate having the portion thereof surrounding said aperture and slot arranged on an arc of a circle.

7. A combined speed regulator and brake, comprising a governor, an actuating lever arranged to retard or stop the same, a laterally movable pin for actuating said lever, and rigid locking means, said pin being arranged to swing laterally into engagement with said locking means.

8. The combination with a governor, and mechanism arranged to retard or stop the same, of longitudinally movable means connected to said mechanism for actuating the same, and locking means, the said actuating means being movable laterally into locking engagement with said locking means.

9. The combination with a governor, and mechanism arranged to vary the speed thereof, of a longitudinally movable pin connected to said mechanism for actuating the same, and locking means, said pin being mounted to swing laterally into locking engagement with said locking means.

10. The combination with a governor and a spring actuated lever to retard or stop the same, of a longitudinally movable pin jointed to said mechanism for actuating said lever and locking means, said pin being mounted to swing laterally into locking engagement with said means.

11. The combination with a governor and mechanism arranged to control the speed of and to retard or stop the same, of a laterally swinging and longitudinally movable pin for actuating said mechanism, the free end of said pin being screw threaded and carrying a thumb-nut, and means for engaging said nut when said pin is swung laterally.

12. In a combined speed regulator and brake, a governor, a spring actuated lever arranged to retard or stop the same, longitudinally movable means for actuating said lever and locking means, said actuating means being arranged to swing laterally to effect a locking engagement with said locking means.

13. A combined speed regulator and brake, comprising a governor, a rotatably adjustable part for regulating the speed of said governor, locking means and connections between said adjustable part and the governor, the said adjustable part being movable longitudinally to retard or stop the rotation of the governor and arranged to swing laterally into locking engagement with said locking means.

14. The combination with a governor and a spring controlled lever, arranged to vary the speed of and to retard and stop the same,

of a longitudinally movable and laterally swinging pin, for operating said lever, the free end of said pin being screw-threaded and carrying a thumb-nut, and means for engaging said nut when the said pin is swung laterally.

15. In a talking machine, a frame having an aperture therein, a governor and mechanism for varying the speed of and to retard or stop said governor, in combination with means extending through the aperture in said frame for operating said mechanism, the said means being mounted to swing laterally into locking engagement with the exterior surface of said frame.

16. In a talking machine, a frame having an aperture therein, a governor and mechanism for varying the speed of and to retard or stop said governor, in combination with a longitudinally movable pin to operate said mechanism, having its free end screw threaded and carrying a thumb-nut, extending through the aperture in said frame, said pin being mounted to swing laterally to effect an engagement between said nut and the exterior of the frame.

17. In a talking machine, a frame having an aperture therein, a governor and mechanism for varying the speed of and to retard or stop said governor, in combination with a longitudinally movable and laterally swinging pin extending through the aperture in said frame and having its free end screw threaded and carrying a nut, a plate having an aperture therein to permit the longitudinal movement of said nut and a slot extending laterally from said aperture to engage said nut.

18. In a talking machine, a frame having an aperture therein, a governor and mechanism for varying the speed of and to retard or stop said governor, in combination with a longitudinally movable and laterally swinging pin extending through the aperture in said frame and having its free end screw threaded and carrying a nut, a plate having a portion thereof raised on an arc of a circle, the said portion having an aperture therein to permit the longitudinal movement of said nut and a slot extending laterally from said aperture to engage said nut.

19. The combination in a governor of a friction disk, a bell crank lever having a friction pad at one end thereof arranged to engage said disk, a longitudinally movable and laterally swinging pin pivotally connected to the other end thereof for actuating said lever and means for locking said pin.

20. The combination in a governor of a friction disk, a bell crank lever having a friction pad at one end thereof arranged to engage said disk, a longitudinally movable and laterally swinging pin pivotally connected to the other end thereof for actuating said lever, the free end of said pin being

screw threaded and carrying a nut, and means for engaging said nut when the pin is swung laterally.

21. The combination with a governor, of a lever arranged to engage the same, said lever being provided with a slot, an actuating pin of fixed length secured in said slot, and means for securing said pin in various positions laterally and longitudinally to control the speed of said governor.

22. The combination with a governor having a friction disk, of a bell crank lever having a friction pad at one end, said lever being pivoted to press said pad against said disk, a rigid pin pivoted to the other end of said lever, and means for securing said pin in various positions laterally and longitudinally to control the speed of the governor.

23. The combination with a governor having a friction disk, of a bell crank lever having a friction pad at one end, said lever being pivoted to press said pad against said disk, a pin pivoted to the other end of said lever, an apertured fixed plate, and a nut upon said pin engaging in said plate to secure said pin in various positions laterally to control the speed of the governor.

24. The combination with a governor having a friction disk, of a spring actuated bell crank lever having a friction pad at one end, said lever being pivoted to press said pad against said disk, a pin pivoted to the other end of said lever, an apertured fixed plate, and a nut upon said pin engaging in said plate to secure said pin in various positions laterally to control the speed of the governor.

25. In a governor, the combination with a rotatable member, of a lever pivoted to engage against said member, a rigid actuating pin jointed to said lever, and means for adjusting said pin in various positions laterally to control the speed of said rotatable member.

26. In a governor, the combination with a rotatable member, of a member pivoted to engage against said member, an actuating pin of fixed length jointed to said member, and means for adjusting said pin in various positions laterally to control the speed of said rotatable member.

27. In a governor, the combination with a rotatable member, of means pivoted to engage against said member, actuating means jointed to said first mentioned means, and means for adjusting said actuating means in various positions laterally to control the speed of said rotatable member.

28. In a governor, the combination with a rotatable member, of a brake member pivoted to engage said rotatable member, an actuating member jointed to said brake member, and means to adjust said actuating member in various positions laterally to control the speed of said rotatable member.

29. In a governor, the combination with a rotatable member, of a brake member arranged to engage said rotatable member, rigid actuating means jointed to said brake member, and means for adjusting said actuating means in various positions laterally to control the speed of said rotatable member.

30. In a governor, the combination with a rotatable member, and friction means engaging said member, of actuating means connected to said friction means to move longitudinally and laterally to stop and start the governor and means to vary the effective length of said actuating means to vary the speed of the governor.

31. In a governor the combination with a friction disk and a friction means engaging said disk, of a pin connected to said friction means to move longitudinally and laterally to stop and start the governor and means to vary the effective length of said pin to vary the speed of said governor.

32. In a governor, the combination with a movable member, of a brake member mounted to engage said movable member, means connected to said brake member for actuating the same, and means carried by said actuating means and adjustable with respect thereto for controlling the speed of said movable member.

33. In a governor the combination with a rotatable member, of a brake member mounted to engage said rotatable member, a pin connected to said brake member for actuating the same, and means mounted on said pin and adjustable longitudinally thereof to control the speed of said rotatable member.

34. In a governor the combination with a rotatable member, of a brake member mounted to engage said rotatable member, a pin connected to said brake member for actuating the same, and a nut threaded upon said pin to control the speed of said rotatable member.

35. In a governor, the combination with a rotatable friction disk, of a brake member mounted to engage said disk, an actuating member connected to said brake member, and means for adjusting said actuating member in various positions laterally and longitudinally to control the speed of said disk.

36. In a governor, the combination with a rotatable friction disk, of a brake member mounted to engage said disk, an actuating member connected to said brake member and carried thereby, a nut screw threaded upon said actuating member and means for adjusting said nut in various positions laterally and longitudinally to control the speed of said disk.

37. In a governor, the combination with a movable member, of a brake member mounted to engage said movable member, an actuating member for said brake member con-

5 nected thereto and moving in unison
therewith, and means for adjusting said
actuating member in various positions later-
ally and longitudinally to control the speed
of the said movable member.

10 38. In a governor, the combination with a
movable member, of a brake member mount-
ed to engage said movable member, means
connected to said brake member for actuat-
ing the same, and means carried by said
actuating member and adjustable with re-

spect thereto for controlling the speed of
said movable member, said actuating mem-
ber and said adjustable means carried there-
by being movable in unison to start or stop
the movable member. 15

In witness whereof I have hereunto set my
hand this 24th day of August, A. D. 1906.

WILBURN N. DENNISON.

Witnesses:

HARRY COBB KENNEDY,
ALEXANDER PARK.

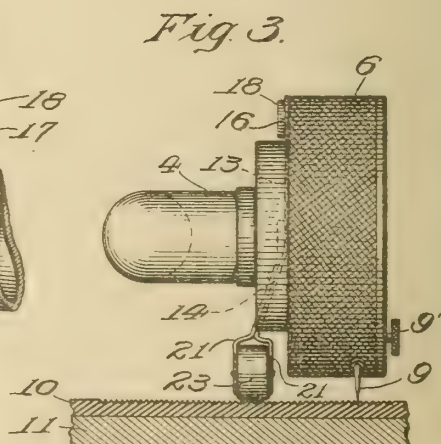
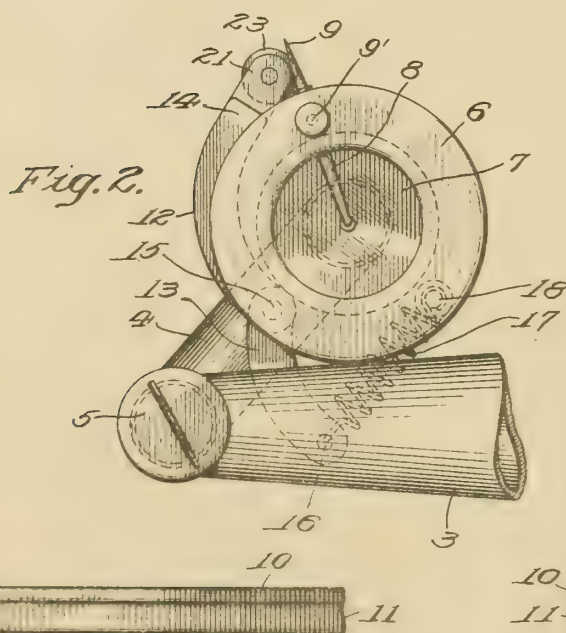
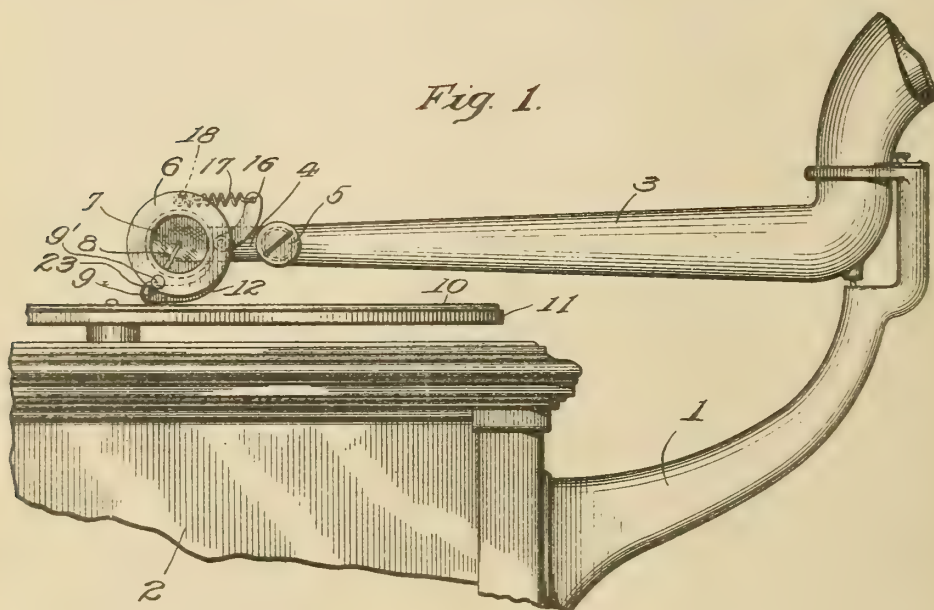




W. N. DENNISON.
COUNTERBALANCED SOUND BOX.
APPLICATION FILED MAR. 12, 1907.

927,505.

Patented July 13, 1909.



WITNESSES:
H. J. Hartman
Alston B. Moulton

INVENTOR
Wilburn N. Dennison
BY *1 + Grace Teltz*
ATTORNEY.

UNITED STATES PATENT OFFICE.

WILBURN N. DENNISON, OF MERCHANTVILLE, NEW JERSEY, ASSIGNOR TO VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW JERSEY.

COUNTERBALANCED SOUND-BOX.

No. 927,505.

Specification of Letters Patent.

Patented July 13, 1909.

Application filed March 12, 1907. Serial No. 361,980.

To all whom it may concern:

Be it known that I, WILBURN N. DENNISON, a citizen of the United States, and a resident of the borough of Merchantville, in the county of Camden and State of New Jersey, have invented certain new and useful Improvements in Counterbalanced Sound-Boxes, of which the following is a full, clear, and complete disclosure.

The object of my invention is to provide means for preventing heavy sound boxes or those of excessive weight from causing the stylus needle thereof from exerting the excessive pressure upon the record.

For a full, clear and exact description of one form of my invention, reference may be had to the following specification and accompanying drawings, in which like reference characters refer to corresponding parts.

In the drawings Figure 1, is an elevational view of my invention, showing the fragmentary portions of the adjacent parts of the machine; Fig. 2 an enlarged view of my invention, showing the sound box turned back on the sound conveying arm; and Fig. 3 an enlarged end view of the sound box turned down into its operative position on the record.

It is sometimes customary in the art to make different parts of a talking machine, especially those parts which come in contact with the sound waves, of excessive proportions in order to produce a clearer tone. In some cases the sound box is enlarged to such a degree as to cause the stylus needle to exert too forcible or abnormal pressure upon the record, thus destroying the revolution of the latter, or retarding the same or doing some other damage to interfere with the operativeness of the machine. To obviate said disadvantages I have provided means for taking that much of the weight off the sound box as the same is heavier, than the ordinary or regular size sound box in common use, or in other words the excessive weight thereof. Otherwise the peculiar construction of this device, the parts of the machine may be constructed like those of variable designs in common use. In the one I have illustrated, however, a supporting arm 1 to attach to a cabinet 2, and to the upper end of the sup-

porting arm is a swinging arm 3 mounted to swing in a horizontal plane and having pivoted to its free end a U shaped tube 4, by the usual hinge 5, the free end of the U shaped tube having mounted thereon the spring 4. The sound box 6, as heretofore stated is of heavy or excessive weight, otherwise being like the construction of any of the several sound boxes common in the art. To the diaphragm 7 is connected the stylus 8 in the usual manner, having a needle 9 inserted in the outer end thereof.

As shown in Figs. 1 and 3 the sound box is in its operative position having the stylus needle 9 resting in grooves of the record 10, which latter is mounted in the usual manner upon the turn table 11. The lever 12 having arms 13 and 14 pivoted at its intermediate portion 15 to the annular face 6' of the sound box 6. The arms 13 and 14 of the lever are curved to be substantially concentric with the annular face of the sound box, when either one of the same is turned to such a position to be coincident therewith. Attached to the extremity 16 of the arm 13 is the spiral spring 17 whose opposite extremity is attached to the pin 18 on a sound box 6. Attached to the extremity of the arm 14, is the yoke arm 21 which taken together with the yoke 22, which is a continuation of the arm 14, form a bearing for the roller 23 which is made of wood or other suitable material that will roll readily over the face of the record without damaging the same.

When the machine is not in operation the sound box may be swung back to rest on the extremity of the sound conveying arm 3 in the usual manner and in such position there being no pressure upon the roller 23 the same will be slightly beyond the stylus point 9, due to the spring 17 having been relieved from its tension. During the operation of the machine, however the box is turned down, as shown in Figs. 1 and 3 so the needle will take its proper position upon the record. Owing to the fact that the roller 23 is beyond the end of the needle it will strike the record first and the weight of the sound box will cause the lever 12 to swing on its pivot until the excessive weight of the sound

box and the tension on the spring 17 are counterbalanced. The pressure exerted by the needle when this counterbalancing action takes place is regulated by the adjustment of the spring 17, which adjustment is arranged to be a permanent one. When the counterbalancing mechanism is first attached the curvature of the arms and their proper dimensions is also determined to a certain standard.

While not admitting that there is no invention in the exact device illustrated and set forth in the above description, yet I wish it directly understood that a lever of other peculiar configurations together with other types of springs may be utilized so long as the device will perform the result herein described and will be within the construction set forth within the appended claims.

Having now described my invention what I desire to claim and protect by Letters Patent of the United States is:

1. In a sound recording and reproducing machine, a sound box and means pivoted to said sound box to counterbalance a part of the weight thereof to prevent an excessive pressure of the stylus upon a record.

2. In a sound recording and reproducing machine, a sound box and means pivoted to said sound box yieldingly restrained to counterbalance a part of the weight of said sound box to prevent an excess of pressure of the stylus upon a record.

3. A record, a horizontally swinging arm, a sound box pivoted to the free end thereof, the said sound box carrying a stylus needle and a pivoted spring restrained lever to counterbalance the excessive pressure of the stylus needle on a record.

4. A record, a horizontally swinging arm, a sound box pivoted to the free end thereof, the said sound box carrying a stylus and being of excessive weight, and means pivoted to said box to counterbalance the excessive pressure of the stylus needle upon a record.

5. In a sound recording and reproducing machine, the combination with a record of a sound box movable to and from the record, said sound box carrying a stylus, a lever fulcrumed at its intermediate portion to said stylus box, and a spring connected to said lever to counterbalance the excessive pressure of the stylus needle upon the record.

6. In a sound recording and reproducing machine, the combination with a record of a sound box movable to and from the record, the said sound box carrying a stylus, a lever fulcrumed at its intermediate portion to said sound box and having such a configuration as to conform substantially with the curvature of one of the annular edges thereof, and a spring connected to the upper arm thereof, to counterbalance the excessive pressure of the stylus needle upon the record.

7. In a sound recording and reproducing

machine, the combination with a record of a sound box movable to and from the record, a lever pivoted at its intermediate portion to the annular edge of the sound box the arms of said lever being of such configuration as to conform to the curvature of one of the annular edges of the sound box when said arms coincide with the annular edge thereof, a spring connecting one end of said lever with the annular edge of the sound box.

8. In a sound recording and reproducing machine, the combination with a sound box, of a record, and means pivoted to said sound box and resting upon the record to counterbalance a part of the weight of said box to prevent an excessive pressure of the stylus needle upon the record.

9. In a sound recording and reproducing machine, the combination with a sound box, a stylus and a record, of spring actuated pivoted means to counterbalance a part of the pressure of the stylus upon the record.

10. In a sound recording and reproducing machine, the combination with a sound box, a stylus and a record, of spring actuated means pivoted to said sound box to counterbalance a part of the pressure of the stylus upon the record.

11. In a sound recording and reproducing machine, the combination of an arm and a sound box secured thereto, the said parts together forming a vertically swinging member, and spring actuated means pivoted to said member to counterbalance a part of the pressure of the stylus upon a record.

12. In a sound recording and reproducing machine, the combination with a sound box, a stylus and a record, of spring actuated means pivoted to said sound box engaging said record to counterbalance a part of the pressure of the stylus upon the record.

13. In a sound recording and reproducing machine, the combination with a sound box carrying a stylus, of pivoted means to counterbalance a part of the weight of said sound box to prevent an excessive pressure of the stylus upon a record during the operation of the machine.

14. In a sound recording and reproducing machine, the combination with a sound box carrying a stylus, of means pivoted to said sound box to counterbalance a part of the weight of said sound box to prevent an excessive pressure of the stylus upon a record during the operation of the machine.

15. In a sound recording and reproducing machine, the combination with a sound box carrying a stylus, of a record and a pivoted lever having a free end restrained to swing in a direction substantially perpendicular to the face of a record to counterbalance a part of the pressure of the stylus upon the record.

16. In a sound recording and reproducing

machine, the combination with a sound box carrying a stylus, of a lever pivoted to said sound box and having a free end restrained to swing in a direction substantially perpendicular to the face of a record to counter-

balance a part of the pressure of the stylus upon the record.

17. In a sound recording and reproducing machine, the combination with a sound box carrying a stylus, of a record and a lever pivoted intermediate of its ends, and a spring connected to one end of said lever, the other end of said lever being yieldingly restrained to swing in a direction substantially perpendicular to the face of a record.

18. In a sound recording and reproducing machine, the combination with a sound box carrying a stylus, of a record, and means pivoted to swing in a direction substantially perpendicular to the face of the record to prevent an excessive pressure of the stylus upon the record.

19. In a sound recording and reproducing machine, the combination with a sound box carrying a stylus, of a record, and means pivoted to swing in a direction substantially perpendicular to the face of a record to prevent the excessive pressure of the stylus upon the record during the operation of the machine.

20. In a sound recording and reproducing machine, the combination with a record, of a sound box movable to and from the record, a stylus carried by said sound box, a lever fulcrumed intermediate its ends to said sound box, and a spring connected to the upper arm of said lever, the free end of said lever being yieldingly restrained to swing in a direction substantially perpendicular to the face of the record to prevent an excessive pressure of the stylus upon the record.

21. In a sound recording and reproducing machine, the combination with a record, of a sound box movable toward and away from the record, a stylus carried by said sound box, and a spring restrained lever pivoted to said sound box and bringing a pressure to bear upon the record when the stylus is in operative engagement therewith to prevent an excessive pressure of the stylus against the record.

22. In a sound recording and reproducing machine, the combination with a record, of a sound box, a stylus carried by said sound box, and a spring restrained pivoted lever bringing a pressure to bear upon the record, when the stylus is in operative engagement therewith, to prevent an excessive pressure of the stylus upon the record.

23. In a sound recording and reproducing machine, the combination with a record, of a sound box movable toward and away from said record, a stylus carried by said sound box, a lever pivoted to said sound box, and a spring connected to said lever to prevent

an excessive pressure of the stylus upon a record.

24. In a sound recording and reproducing machine, the combination with a record, of a sound box movable to and from the record, a stylus carried by said sound box, a lever pivoted to one of the faces of said sound box near the periphery, and a spring connected to one end of said lever to prevent an excessive pressure of the stylus upon the record.

25. In a sound recording and reproducing machine, the combination with means for supporting a stylus, of a lever fulcrumed intermediate of its ends to said means, and a spring connected to said lever to counterbalance the excessive pressure of the stylus upon a record.

26. In a sound recording and reproducing machine, the combination with means for supporting a stylus, of a lever fulcrumed intermediate of its ends to said means, a roller carried by one end of said lever, and a spring connected to the other end of said lever to counterbalance the excessive pressure of the stylus upon a record.

27. In a sound recording and reproducing machine, the combination with means for carrying a stylus, of a lever pivoted to said means, and a spring connected to said lever to prevent an excessive pressure of the stylus upon a record.

28. In a sound recording and reproducing machine, the combination with a record, of means for carrying a stylus across said record, a lever pivoted to said means and having a portion yieldingly restrained to swing in a direction substantially perpendicular to the face of the record to prevent an excessive pressure of the stylus upon the record.

29. In a sound recording and reproducing machine, the combination with means for carrying a stylus, of means yieldingly restrained to oscillate upon said first mentioned means to prevent an excessive pressure of the stylus upon a record.

30. In a sound recording and reproducing machine, the combination with a stylus bar mounted to oscillate, of means mounted to oscillate upon an axis fixed with respect to the axis of oscillation of said bar to prevent an excessive pressure of the stylus upon a record.

31. In a sound recording and reproducing machine, the combination with a stylus bar mounted to oscillate, of a lever mounted upon an axis fixed with respect to the axis of oscillation of said bar, and a spring to restrain the oscillation of said lever to prevent an excessive pressure of the stylus upon a record.

32. In a sound recording and reproducing machine, the combination with a stylus, mounted to oscillate, of means mounted to oscillate upon an axis fixed with respect to

the axis of oscillation of the stylus, and yieldingly restrained to prevent an excessive pressure of the stylus upon a record.

33. In a sound recording and reproducing
5 machine, a sound box, and means mounted
on said sound box to counterbalance a part
of the weight thereof.

34. In a sound recording and reproducing
10 machine, a sound box, and counterbalancing
means mounted on said sound box to support

a part of the weight thereof and to prevent
an excessive pressure of the stylus upon a
record.

In testimony whereof, I have hereunto set
my hand this 9th day of March, A. D. 1907. 15

WILBURN N. DENNISON.

Witnesses:

ALSTON B. MOULTON.

ALEXANDER PARK.

F. F. MURDOCK.
SPEED CHANGING MECHANISM FOR GRAPHOPHONES.
APPLICATION FILED MAR. 19, 1909.

927,809.

Patented July 13, 1909.

2 SHEETS—SHEET 1.

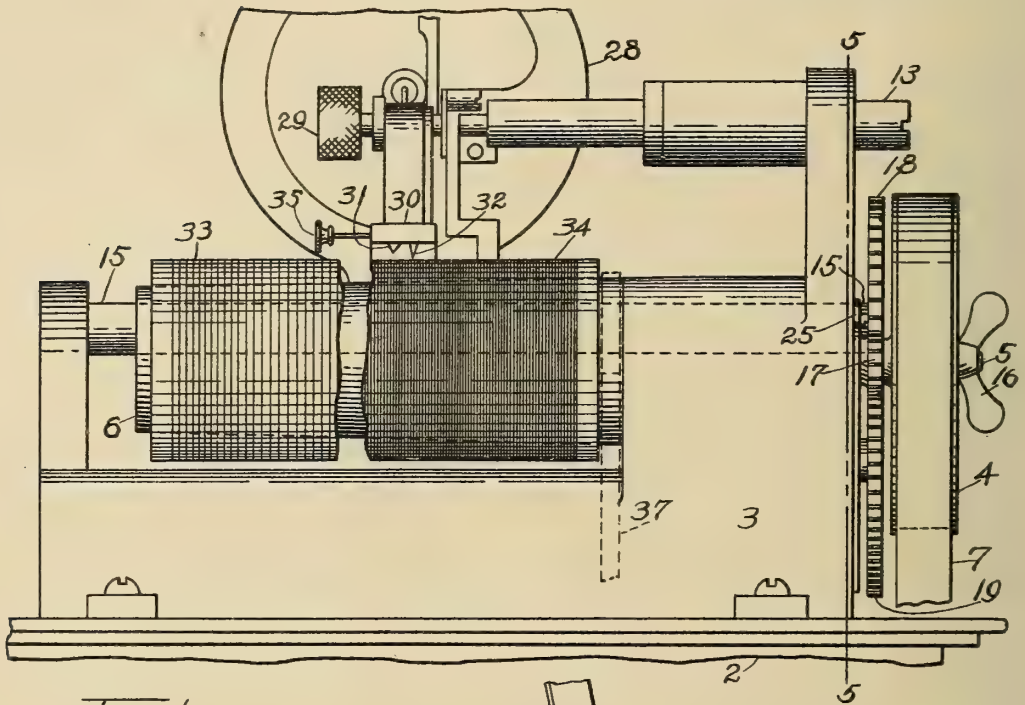


Fig. 1.

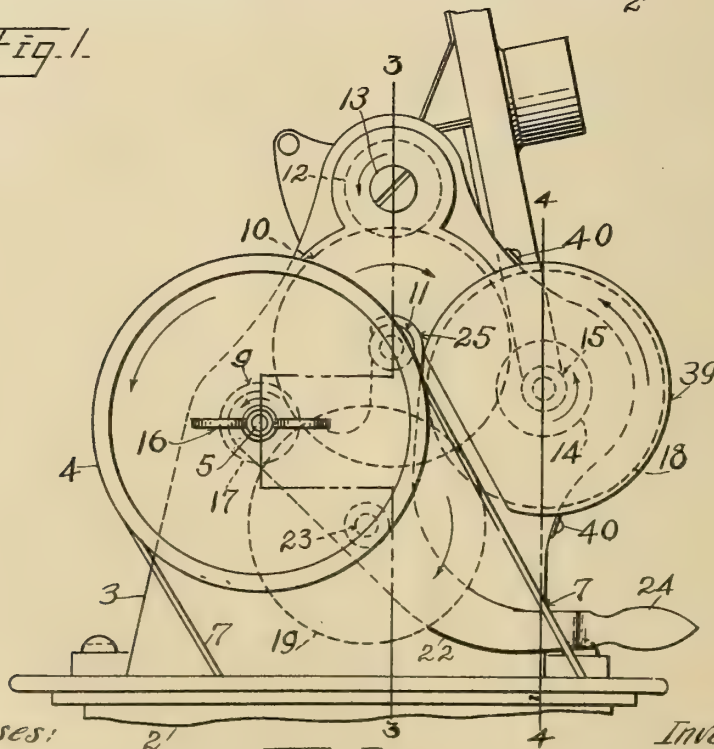
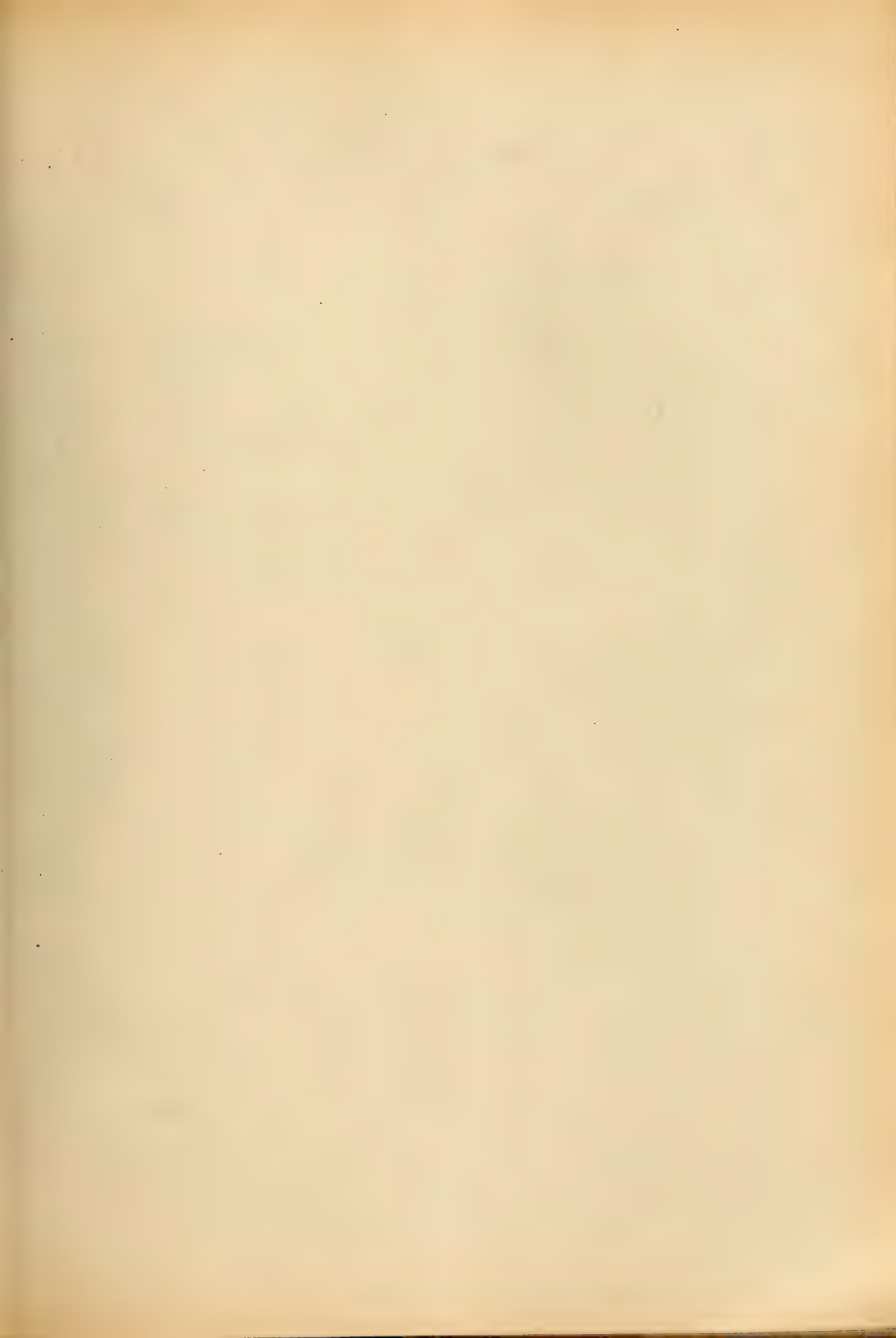


Fig. 2.

Witnesses:
J. P. Brewer
R. L. Wallace

Inventor,
Frederick F. Murdock,
By Harry D. Wallace,
Attorney.



F. F. MURDOCK.
SPEED CHANGING MECHANISM FOR GRAPHOPHONES.
APPLICATION FILED MAR. 19, 1909.

927,809.

Patented July 13, 1909.

2 SHEETS—SHEET 2.

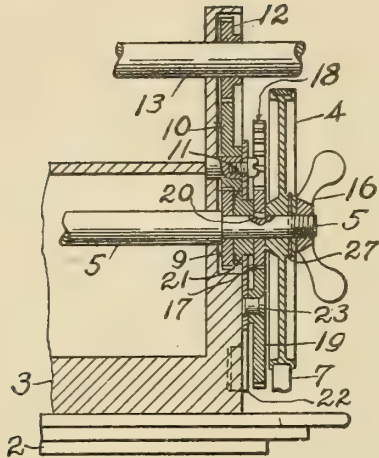


Fig. 3.

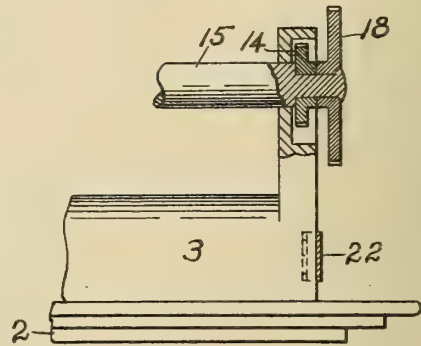


Fig. 4.

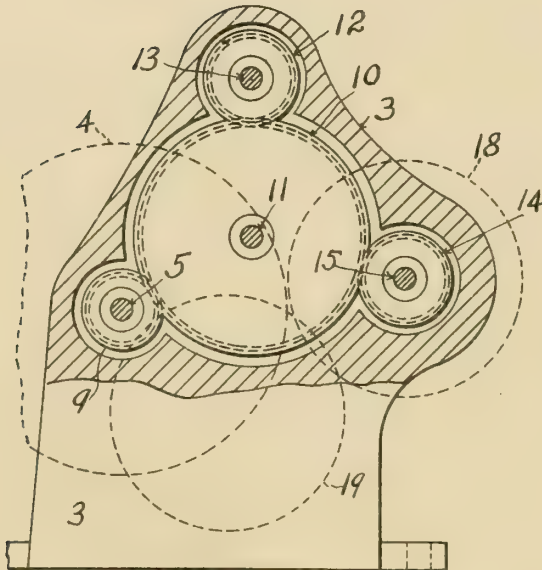


Fig. 5.

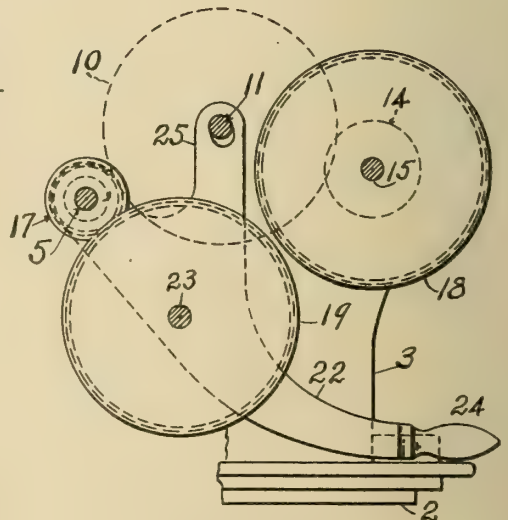


Fig. 6.

Witnesses:
J. F. Brewer,
R. L. Wallace

Inventor,
Frederick F. Murdock,
By Harry D. Wallace
Attorney.

UNITED STATES PATENT OFFICE

FREDERICK F. MURDOCK, OF SYRACUSE, NEW YORK.

SPEED-CHANGING MECHANISM FOR GRAPHOPHONES.

No. 927,809.

Specification of Letters Patent.

Patented July 13, 1909.

Application filed March 19, 1909. Serial No. 484,343.

To all whom it may concern:

Be it known that I, FREDERICK F. MURDOCK, a citizen of the United States, residing at Syracuse, in the county of Onondaga and State of New York, have invented certain new and useful Improvements in Speed-Changing Mechanism for Graphophones, of which the following is a specification.

This invention relates to improvements in speedchanging mechanism for graphophones, and has for its object to provide an additional attachment or mechanism, by means of which both the old and the new machines may be readily adapted to play what is commonly known as the standard two minute record, and also a new four minute record which has recently been produced.

The invention relates particularly to improvements in the devices shown and described in my pending application, filed Jan. 25, 1909, Serial No. 473,963.

The present invention consists of the features and parts set forth in the detail description which follows, and as illustrated by the accompanying drawings, which form a part of this specification, and in which—

Figure 1 is a side elevation of a graphophone, showing the location and arrangement of the principal parts of my invention; also showing a portion of the old and new records. Fig. 2 is a front end elevation of the machine. Fig. 3 is a sectional view on line 3—3 of Fig. 2. Fig. 4 is a sectional view on line 4—4 of Fig. 2. Fig. 5 is a sectional view on line 5—5 of Fig. 1. Fig. 6 is a part end elevation showing the manner of throwing the auxiliary train of gears out of mesh.

In the accompanying drawings, 2 represents the case or box, in which a spring motor or other mechanism for driving a graphophone is disposed.

3 represents the body of the machine which is mounted upon the top of the case or box 2.

4 represents a pulley mounted upon a shaft 5, the latter being journaled in the body 3, on the opposite end of which is mounted a tapering cylinder 6 which carries the record. Pulley 4 is driven by a belt 7, which passes downwardly into the case and connects with the motor or other source of power. In a cavity in the front end of body 2 is disposed the usual train of spur gears employed for playing the old two minute records.

9 represents the smaller gear of the train, which is loosely mounted upon the shaft 5, and meshes with an idler gear 10, mounted

on a screw or stud 11, supported by the body 2. Gear 10 meshes with a third gear 12, which is mounted upon and operates what is called the "amber" shaft 13. The idler 10 also meshes with a fourth gear 14 which is mounted upon a feed shaft 15, which supports and carries the sound box or reproducer, needles, horn and other parts.

On all of the graphophones, so far as known to me, the outer end of shaft 5 is threaded and projects beyond the record pulley 4, to which a common nut (not shown) is applied and employed for holding the inner hub of pulley 4 tightly against gear 9, and by this means the said gear is rotated with said pulley and said shaft, and drives the gears 10, 12 and 14. In the old machines the nut referred to, is always maintained in its tightened position except when the machine is being taken apart. In the present invention this old nut is removed from shaft 5, and a thumb-nut 16 substituted, the office of which will later be described.

The speed changing mechanism embodying my improvement consists of an auxiliary train of spur gears designated by the numerals 17, 18 and 19, all of which are preferably mounted on the front end of the body 2, as shown. The gear 17, which is preferably the same size and has the same number of teeth as the gear 9, is mounted upon shaft 5, and positively driven thereby, by means of a key or spline 20. The gear 17 is spaced from the gear 9 by a collar 21, loosely journaled on shaft 5. The collar having an outwardly extending hub which receives and forms a pivotal bearing for an operating lever 22. Gear 17 is constantly in mesh with the idler gear 19, which is journaled on the outer face of lever 22, by means of a screw or stud 23. Gears 17, 18 and 19 are all disposed in the same plane, and gear 19 is so positioned that it may be thrown into mesh with the gear 18, by the raising of lever 22 to the position shown in Fig. 2, or it may be thrown out of mesh with gear 18, by the shifting of lever 22 to the position shown in Fig. 6. Gear 18 is rigidly secured to the outer end of the feed shaft 15, and operates with said shaft the same as the old gear 14. The arrows in Fig. 2 show the direction of travel of the gears of both trains.

The lever 22 preferably lies flat against the face of the machine, and is provided with a handle 24, which projects past the rear side of the machine. Lever 22 is also provided

with an upwardly extending arm 25, which is perforated to receive the screw or stud 11, which is utilized for holding the lever in place, and the screw should be set tight enough, so
 5 that its head may exert sufficient frictional tension to hold the lever in either its upper or lower position. The perforation in the arm 25 of the lever is preferably made larger than the body of screw 11, to allow for suitable
 10 play of the lever when operating the gear 19.

In the old train of gears, the gear 9 must turn about two and one-half times in order to rotate the feed gear 14 and shaft 15 once.
 15 Under this arrangement the working parts are operated in proper time and at the right speed for playing the coarse two minute records, which are provided with about one hundred threads or turns per inch. The new
 20 four minute records have a finer threading, about two hundred threads per inch, and in order to adapt either the old or new machines for playing the new, as well as, the old records, it is necessary to provide an additional gearing
 25 by means of which the normal speed of the machine may be reduced substantially one-half. In the present device this reduction is accomplished by providing the gear 18 with
 30 by the gear 17, as compared with two and one-half times that number of teeth as carried by the gear 14.

In assembling the parts of the machine, the gear 9 is placed in position on the shaft 5,
 35 being loosely journaled thereon, and the collar 21 is next placed in position. The collar also being loose on said shaft. Gear 17 is next placed on the shaft, it having a key-way to engage the key 20, by means of which this
 40 gear is driven. The pulley 4 is then mounted on shaft 5 and held in place by a pin 27. And lastly the thumb-nut 16 is applied to the threaded outer end of shaft 5. Under this
 45 disposition and arrangement of the parts referred to, the tightening up of the thumb-nut 16 forces the pulley 4, the gear 17 and the collar 21 inwardly, and the latter when
 50 made to bear sufficiently hard against the gear 9 will effect the positive driving of said gear, and through it the several other gears, as 10, 12 and 14. This is the condition of the parts, and the manner of adjusting them for playing the old two minute records.

To readjust the gearing of a machine having my speed changing parts applied, the operator should first unscrew the thumb-nut 16, so as to relax the tension between the collar 21 and gear 9, and allow said parts to play
 55 idly upon shaft 5. He should next lift the lever 22 from the position shown in Fig. 6, to the position shown in Fig. 2, which will effect the meshing of gear 19 with gear 18. The gear 17 which is keyed to shaft 5 will then drive gear 19, and the latter will drive gear
 60 18, which is mounted rigidly upon the feed

shaft 15. The gear 18 being relatively twice the diameter of gear 14, will require double the number of turns of the driving gear 17 to rotate it once, or in other words, to reduce
 70 the speed of the feed shaft 14, to correspond with the finer threading of the new four minute records, hereinbefore explained. Thus when thumb-nut 16 is loosened and lever 22 is raised to connect gears 19 and 18 (see Fig. 2) my new train of gears do all the work of
 75 feeding the reproducing parts at the reduced speed required, while the old train of gears work idly. On the other hand, when the nut 16 is tightened up, and the lever 22 is shifted to its lower position, to break the mesh between the gears 18 and 19, the old train of
 80 gears 9, 10, 12 and 14 become the positive drivers for the feed parts, and operate them at the old or normal rate of speed.

The usual sound box 28 is adjustably
 85 mounted on shaft 15, and other well-known reproducing parts as the amber wheel (not shown) and the weight 29 are carried and operated by the shaft 13. The usual stylus support 30 is also shown, and carries a coarse
 90 and a fine stylus, as 31 and 32 respectively. The coarse stylus is for operating on the old record 33, while the fine stylus is for the new record 34, and 35 represents a handknob and rod employed for manipulating the styluses.
 95 39 represents a shield for the gear 18 which may be applied in any suitable manner as by screws 40.

In many of the smaller and cheaper grades of graphophones, the driving belt is applied
 100 direct to the cylinder 6, as shown at 37, Fig. 1, the pulley 4 is omitted, and the amber shaft 13 and the gear 12 are also omitted. In all such machines, my new train of gears, 17, 18 and 19, and also lever 22, may be employed for reducing the speed of the old
 105 mechanism, for adapting the same for playing the four minute records, the same as for the style of machine shown in Figs. 1 to 5 inclusive, and the lever 22 with its arm 25 may
 110 be employed for alternately throwing the gears 10 and 19 into and out of mesh with the feed gears 14 and 18, as may be seen by reference to Fig. 6, in which the lowering of the lever 22 disconnects gears 18 and 19 and at
 115 the same time engages gears 10 and 14, while the raising of the lever will disconnect the latter and connect the former.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is—

1. In a graphophone, the combination with a record and an operating mechanism therefor, and a reproducing stylus and a feed mechanism therefor, the said mechanism
 125 comprising a train of gears timed for playing standard "two minute" records, of an auxiliary train of spur gears, one of said gears carried by the record operating shaft and positively driven thereby, the second gear
 130

carried by the feed shaft, and a third gear comprising an idler adapted for operatively connecting the first and second gears for reducing the speed of the feed mechanism for playing a four minute record, and a lever pivotally mounted on said record shaft adapted for shifting said third gear into or out of mesh with said second gear.

2. In a graphophone, the combination with a record and an operating mechanism therefor, and a reproducing stylus and a feed mechanism therefor, the said mechanism comprising a train of gears timed for playing standard "two minute" records, of an auxiliary train of spur gears, one of said gears carried by the record operating shaft and positively driven thereby, the second gear carried by the feed shaft, and a third gear comprising an idler adapted for operatively connecting the first and second gears for reducing the speed of the feed mechanism for playing a four minute record, and a nut carried by the record shaft adapted for adjusting the speed of the reproducing parts for playing either a long or a standard record.

3. A speed changing mechanism for graphophones, comprising an auxiliary train of gears, one of said gears carried by the record operating parts of the machine, a second gear carried by the reproducing parts of the machine, and a third gear, being an idler, adapted for making or breaking the driving connection between said first and second gear, a lever operatively supporting said idler gear, and a nut carried by the record operating parts adapted to cooperate with said lever and said gears for increasing or decreasing the speed of the machine.

4. A speed changing gearing for graphophones, comprising a pair of spur-gears of unequal size, the smaller of said gears being mounted on the record shaft, the larger of said gears being mounted on the reproducing feed shaft, the relative difference between said gears being sufficient to reduce the normal speed of the machine approximately one-half, thereby to adapt said machine for playing a four minute record, an idler gear to operatively connect said large gear with said small gear, and a lever pivoted to the record shaft capable of making and breaking the connection between said small and said large gear.

5. A speed changing gearing for graphophones, comprising a pair of spur-gears of unequal size, the smaller of said gears being mounted on the record shaft, the larger of said gears being mounted on the reproducing feed shaft, the relative difference between said gears being sufficient to reduce the normal speed of the machine approximately one-half, thereby to adapt said machine for playing a four minute record, an idler gear to operatively connect said large

and said small gear, a lever pivoted to the record shaft capable of making and breaking the connection between said small and said large gear, and a thumb-nut carried by said record shaft for adjusting the machine for playing records of different length.

6. In a graphophone, the combination with a record and an operating mechanism therefor, and a reproducing stylus and a feed mechanism therefor, the said mechanisms being normally geared for playing standard two minute records, of a pair of spur-gears of unequal size one carried by said record operating mechanism, the other carried by said feed mechanism, the relative difference in the size of said gears being sufficient to reduce the travel of the stylus approximately one-half, thereby to adapt said machine for playing a four minute record, an idler gear to connect said spur-gears being constantly in mesh with one of said spur-gears, and a hand lever to support said idler gear, the said lever capable of throwing said idler gear into or out of mesh with the second spur-gear.

7. In a graphophone, the combination with a record and an operating mechanism therefor, and a reproducing stylus and a feed mechanism therefor, the said mechanisms being normally geared for playing standard two minute records, of a pair of reducing gears of unequal size, one carried by said record operating mechanism, the other carried by said feed mechanism, the difference in the size of said gears being sufficient to reduce the travel of the feed mechanism approximately one-half, thereby to adapt said machine for playing a four minute record, an idler gear to connect said reducing gears being constantly in mesh with the smaller of said gears, a lever to support said idler gear, the said lever capable of throwing said idler gear into or out of mesh with the larger reducing gear, and a nut carried by the record operating mechanism adapted to control the changing of the speed of the feed mechanism.

8. A graphophone having a shaft adapted for carrying records of different length, and a shaft for carrying and feeding the reproducing parts, and having a train of gears connecting the said shafts, one of said gears mounted loosely on the record shaft, and one of said gears mounted rigidly on the feeding shaft, a pulley for driving said record shaft, a source of power, a belt connecting said source of power with said record pulley, a reduction gearing comprising a small gear keyed to the record shaft and a large gear rigidly secured to the end of the feed shaft, a collar disposed between the gears on said record shaft, a nut mounted on the end of the record shaft adapted for frictionally connecting the first named gear to said record shaft, an idler gear to connect said reduction gears, and a lever to support said idler gear, the said lever ar-

1 ranged to hold said idler gear constantly in
2 mesh with said small gear, and adapted to
3 make or break the driving connection be-
4 tween said small and said large gear, for
5 changing the speed of the reproducing parts
6 from normal to a lower speed and vice versa.

7 9. An attachment for reducing the speed
8 of graphophones, comprising a small gear and
9 a large gear operatively connected by an
10 idler gear, the small gear keyed to the record
11 shaft of the machine, the large gear mounted
12 upon the feed shaft of the machine, an oper-
13 ating lever pivoted to the record shaft, the
14 said idler gear mounted upon said lever, the
15 idler gear constantly in mesh with the small
16 gear, and adapted to be connected with and
17 disconnected from the large gear by the rais-
18 ing and lowering of said lever.

19 10. An attachment for reducing the speed
20 of the reproducing parts of graphophones,
21 comprising a gear mounted on the record
22 shaft, and a second gear mounted on the feed
23 shaft, a lever pivoted to said record shaft, an
24 idler gear mounted on said lever in position
25 to be held constantly in mesh with the gear
26 on the record shaft, and also adapted to
27 mesh with the gear on said feed shaft by the
28 operation of said lever.

29 11. A graphophone having a record bear-
30 ing and operating shaft, and a pulley for driv-
31 ing said shaft, and having a train of gears for
32 operating the reproducing parts, one of said
33 gears mounted upon the record shaft, and a
34 second gear carried by a feed shaft, in com-
35 bination with a motor connected with said
36 pulley, of a reduction gearing comprising a
37 gear keyed to the record shaft, and a gear
38 mounted on the feed shaft, an idler gear to
39 connect said gears when a four minute record
40 is to be played, a lever pivoted to the record
41 shaft, the said lever supporting said idler
42 gear, and adapted for shifting said idler gear
43 into and out of mesh with the gear on said
44 feed shaft, and a nut carried by the record
45 shaft adapted when tightened up to cause the
46 feed shaft to be operated at a fast speed for
47 playing two minute records, and when
48 loosened to permit the said reduction gear-
49 ing to operate said feed shaft at a slower
50 speed for playing four minute records.

51 In testimony whereof I affix my signature
52 in presence of two witnesses.

FREDERICK F. MURDOCK.

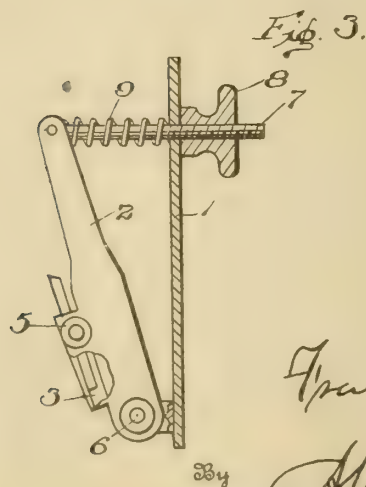
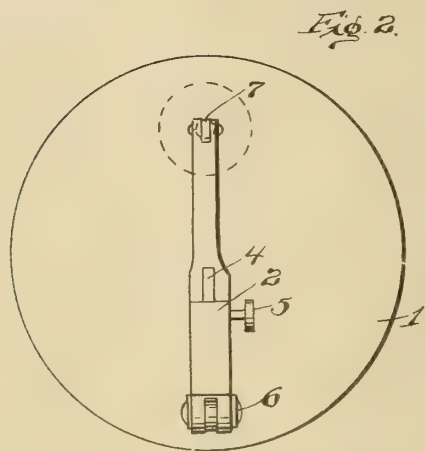
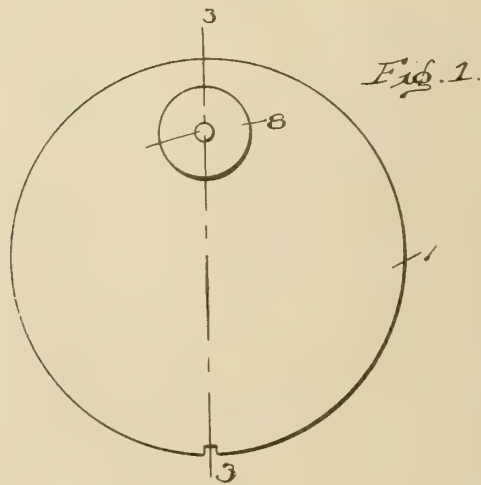
Witnesses:

WM. C. ANDERSON,
HARRY DE WALLACE.

F. ABLE, JR.
TURNING AND SMOOTHING DEVICE FOR PHONOGRAPH RECORDS.
APPLICATION FILED JAN. 22, 1909.

928,015.

Patented July 13, 1909.



Witnesses
J. M. Fowler
M. L. Legg

Inventor
Frank Able Jr.
M. L. Legg
Attorney

UNITED STATES PATENT OFFICE.

FRANK ABLE, JR., OF LOUISVILLE, KENTUCKY.

TURNING AND SMOOTHING DEVICE FOR PHONOGRAPH-RECORDS.

No. 928,015.

Specification of Letters Patent.

Patented July 13, 1909.

Application filed January 22, 1909. Serial No. 473,659.

To all whom it may concern:

Be it known that I, FRANK ABLE, JR., a citizen of the United States, residing at Louisville, in the county of Jefferson and State of Kentucky, have invented certain new and useful Improvements in Turning and Smoothing Devices for Phonograph-Records, of which the following is a specification.

1) This invention relates to turning and smoothing means, and particularly to means for turning and smoothing phonograph records, and has for an object the provision of a cutter and holding means therefor that will cause the cutter to evenly and smoothly turn or shave a phonograph record.

Another object of the invention is the provision of a plate adapted to fit into the reproducer arm of a phonograph and a cutting tool adjustably secured thereto which in turn is adapted to shave or turn a phonograph record evenly, smoothly and perfectly true.

With these and other objects in view the invention comprises certain novel constructions, combinations and arrangement of parts as will be hereinafter more fully described and claimed.

In the accompanying drawings: Figure 1 is a top plan view of one embodiment of the invention. Fig. 2 is a bottom plan view of the structure shown in Fig. 1. Fig 3 is a section through Fig. 1 approximately on line 3—3.

In constructing a turning or shaving device according to the present invention I provide a diaphragm plate which fits in the reproducer arm of a phonograph and to this plate secure a pivotally mounted tool support or holder. A tool is so mounted in this holder as to present its cutting edge to the record when the reproducer is mounted on a phonograph and by means of an adjustable rod the tool holder may be moved toward or from the record for causing a heavy or light cut to be made when the record is turned. In this manner a new blank or an old record may be shaved or turned smoothly and evenly preparatory to receiving a record thereon.

5) In order that the invention may be more fully understood I have shown in the accompanying drawing an embodiment of the invention in which—

1 indicates a plate commonly known as the diaphragm plate which has pivotally secured thereto an arm or tool holder 2. The

tool holder 2 is formed with a socket 3 into which is placed one end of a tool 4. The tool 4 is held in place preferably by a set screw 5 and also preferably has its lower end in engagement with the bottom of socket 3 though it is not necessary. If desired tool 4 may be moved outward so that its lower end will be a considerable distance from the bottom of socket 3 and yet be firmly held in position by set screw 5.

The tool holder 2 is pivotally connected at its lower end to plate 5 by pin 6 and is pivotally connected at its upper end to an adjusting rod 7. The adjusting rod 7 extends from its pivotal point on tool holder 2 to and through an aperture in plate 1. The end of rod 7 passing through plate 1 is threaded for any desired distance in order to accommodate an adjusting wing nut 8. Surrounding rod 7 and positioned between plate 1 and tool holder 2 is a spring 9 which has a tendency to force outward tool holder 2. By the use of spring 9 the tool 4 is held yieldingly to its work and by the use of rod 7 and nut 8 the position of the tool is regulated.

In operation plate 1 is placed in a reproducer arm on a phonograph and tool 4 set by properly adjusting nut 8. After the tool has been properly set the phonograph is started and as the record revolves the tool removes all former incisions or records or if a blank is placed in the machine it is simply turned smooth and true. If the first cut does not remove all the incisions of a previous record a second cut may be taken as will be evident.

In the use of tools a cutter may be used constructed simply of a piece of steel that will take a fine edge or if desirable a tool may be made with a sapphire point or cutting end.

What I claim is:

1. In a device of the character described, a plate, a tool holder secured to said plate, a tool secured to said tool holder, a rod pivotally secured to said tool holder, and a nut threaded to said rod and acting against said plate for moving said rod whereby said tool holder and said tool are adjusted.

2. In a device of the character described, a plate, a tool holder secured to said plate, a tool secured to said tool holder, a rod pivotally secured to said tool holder, means acting against said plate to move said rod in one direction, and means positioned between said tool holder and said plate for moving said

tool holder in the opposite direction, the movement of said rod being adapted to vary the position of said tool and said tool holder.

3. In a device of the character described, a
5 plate, a tool holder connected to said plate, a
tool secured to said tool holder, a rod secured
to said tool holder, means threaded on to said
rod for moving the rod in one direction, and a
spring for moving the rod in the opposite di-
10 rection, the movement of said rod being
adapted to vary the position of said tool
holder and said tool.

4. In a device of the character described, a
plate, a tool holder pivotally connected
15 therewith, a tool secured to said tool holder,

a rod pivotally connected with said tool
holder, means threaded on said rod for moving
said rod in one direction, and a spring sur-
rounding said rod and positioned between
said tool holder and said plate for moving 20
said rod in an opposite direction, the move-
ment of said rod varying the position of said
tool holder and said tool.

In testimony whereof I affix my signature
in presence of two witnesses.

FRANK ABLE, JR.

Witnesses:

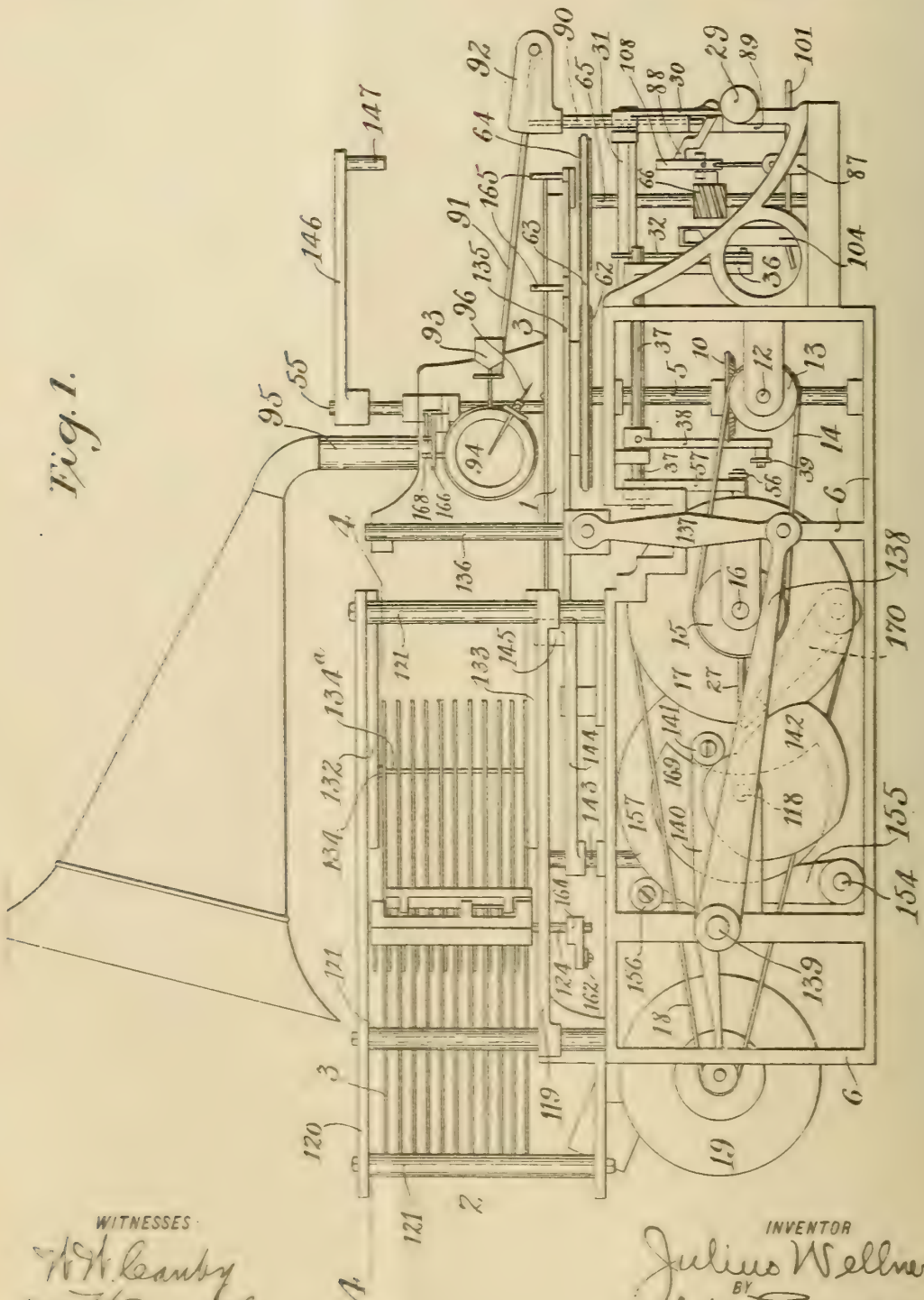
LAYDE Z. MCKINNEY,
D. E. PROCTOR.

J. WELLNER.
SOUND REPRODUCING MACHINE.
APPLICATION FILED DEC. 15, 1903.

928,567.

Patented July 20, 1909.

7 SHEETS—SHEET 1.



WITNESSES:
W. H. Leamy
J. H. Gamble

INVENTOR
Julius Wellner
BY
A. V. Trout
ATTORNEY.



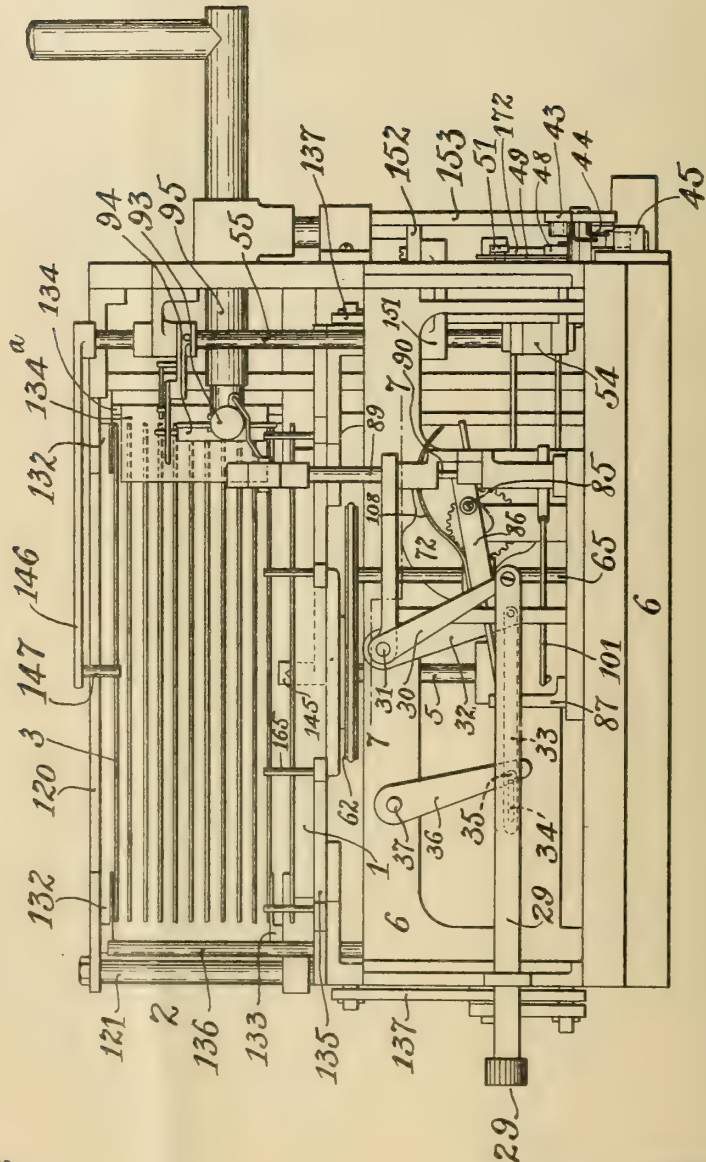
J. WELLNER.
SOUND REPRODUCING MACHINE.
APPLICATION FILED DEC. 15, 1903.

928,567.

Patented July 20, 1909.

7 SHEETS—SHEET 2.

Fig. 2.

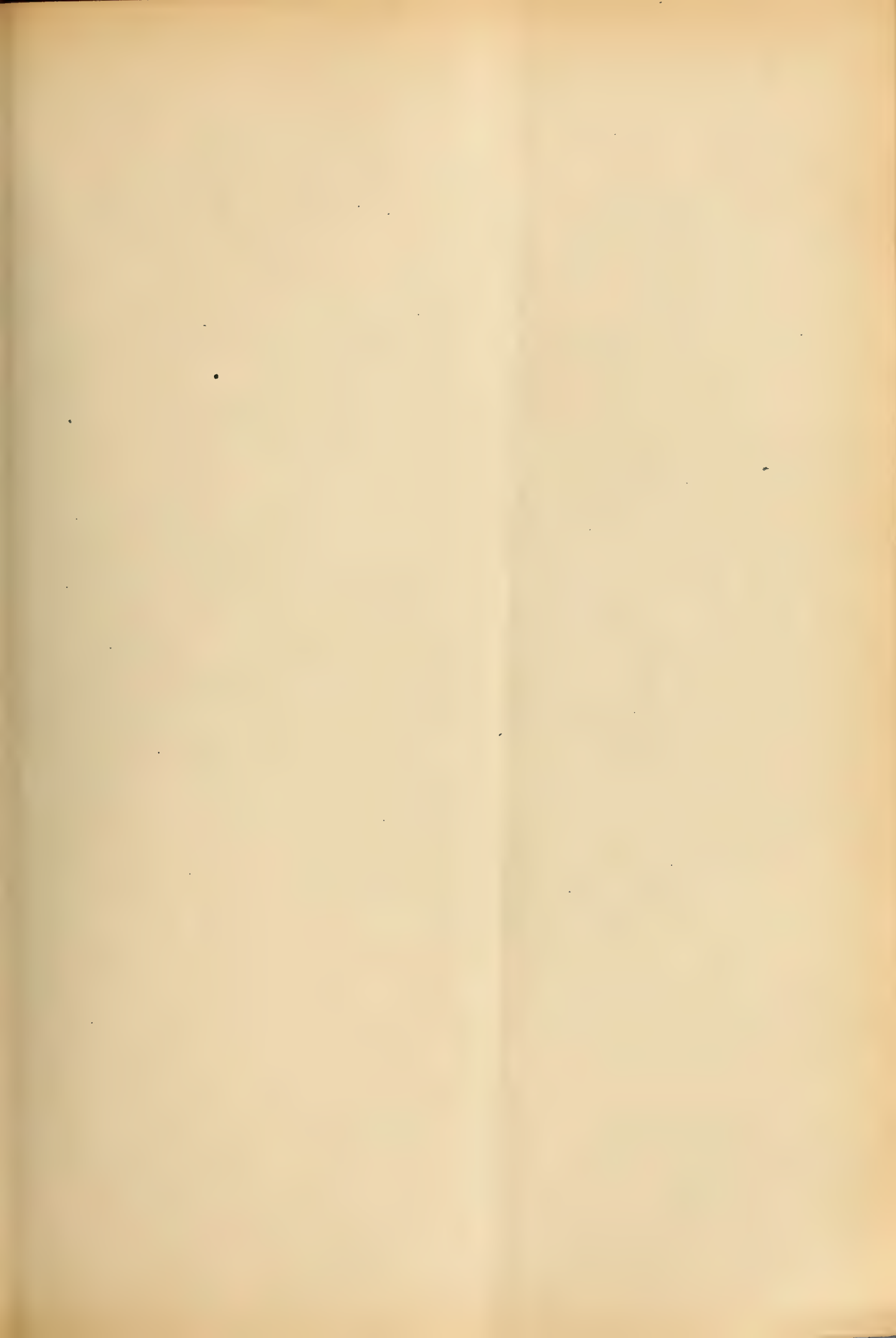


WITNESSES:

W. H. Leamy
J. H. Gamble

INVENTOR

Julius Wellner
BY
A. V. Jones
ATTORNEY.



J. WELLNER.
SOUND REPRODUCING MACHINE.
APPLICATION FILED DEC. 15, 1903.

928,567.

Patented July 20, 1909.

7 SHEETS—SHEET 3.

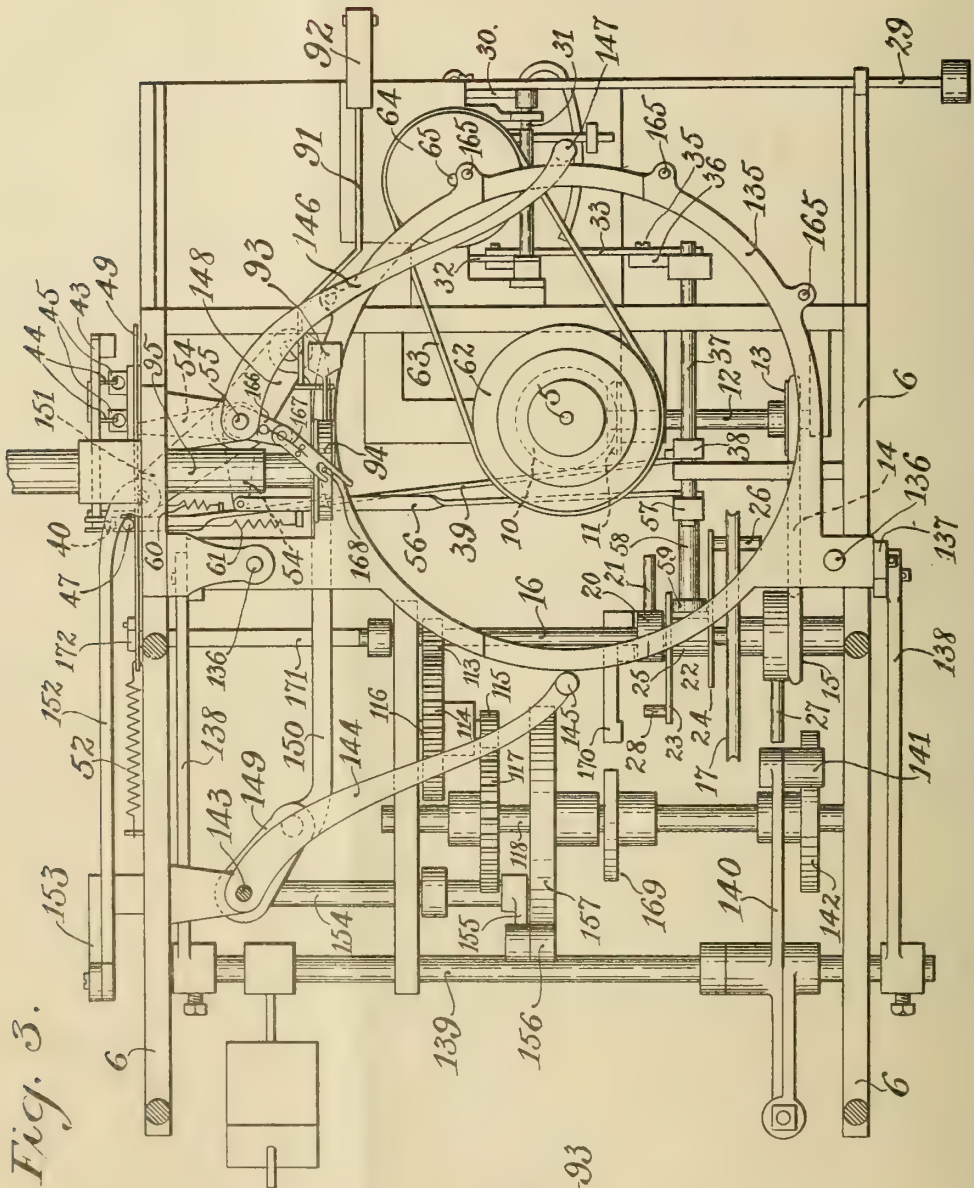


Fig. 3.

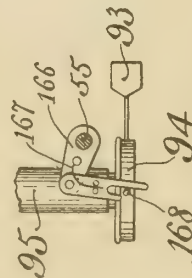


Fig. 3a.

WITNESSES:

H. H. Leuby
J. F. Gamble

INVENTOR
Julius Wellner
BY
A. V. Trout
ATTORNEY.



J. WELLNER.
SOUND REPRODUCING MACHINE.
APPLICATION FILED DEC. 15, 1903.

928,567.

Patented July 20, 1909.

7 SHEETS—SHEET 4.

Fig. 4.

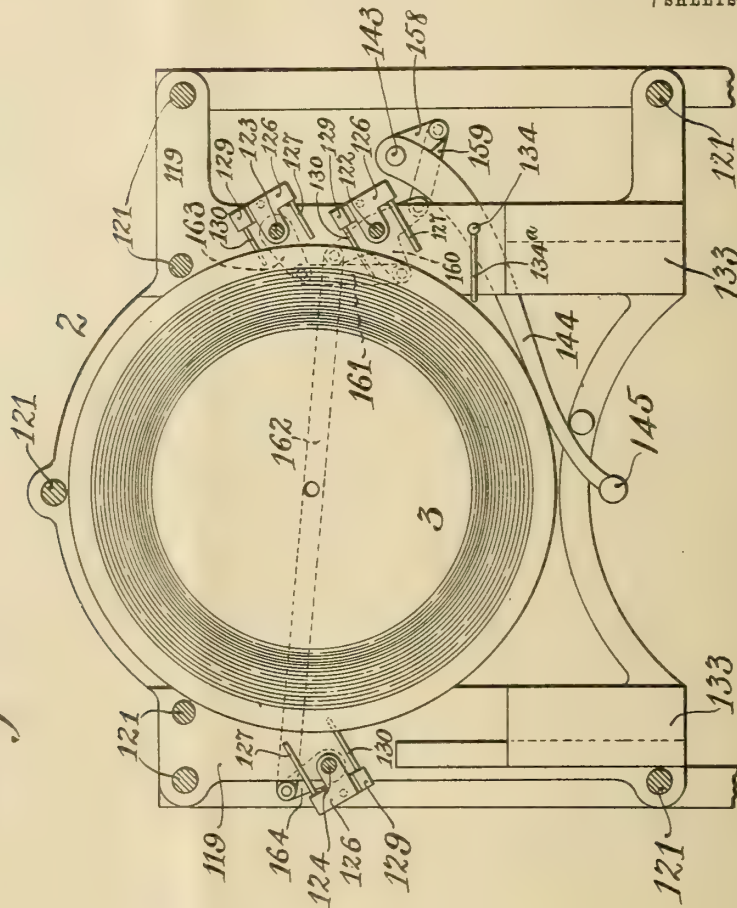
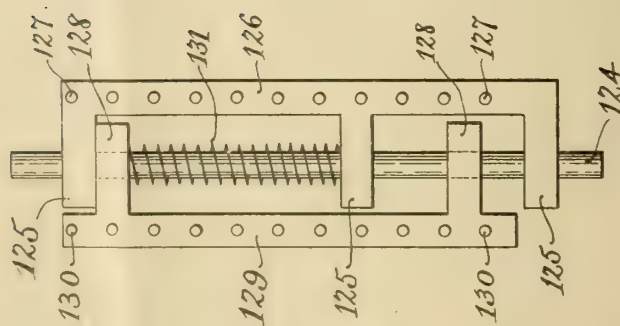


Fig. 5.



WITNESSES:

W. H. Canby
J. H. Gamble

INVENTOR

Julius Wellner
BY
A. V. Grout
ATTORNEY.

J. WELLNER.
SOUND REPRODUCING MACHINE.
APPLICATION FILED DEC. 15, 1903.

928,567.

Patented July 20, 1909.

7 SHEETS—SHEET 5.

Fig. 7.

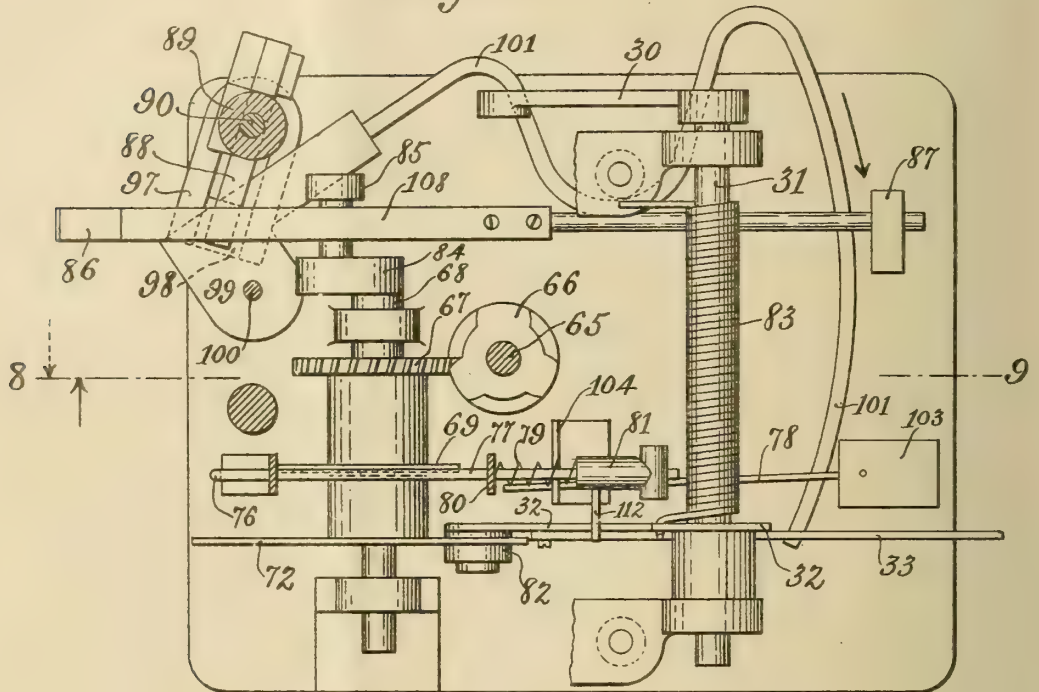
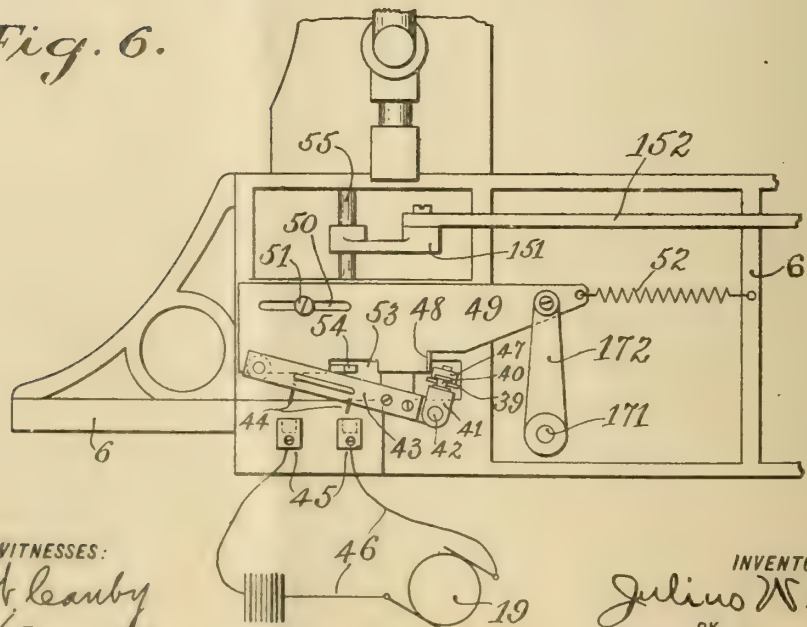
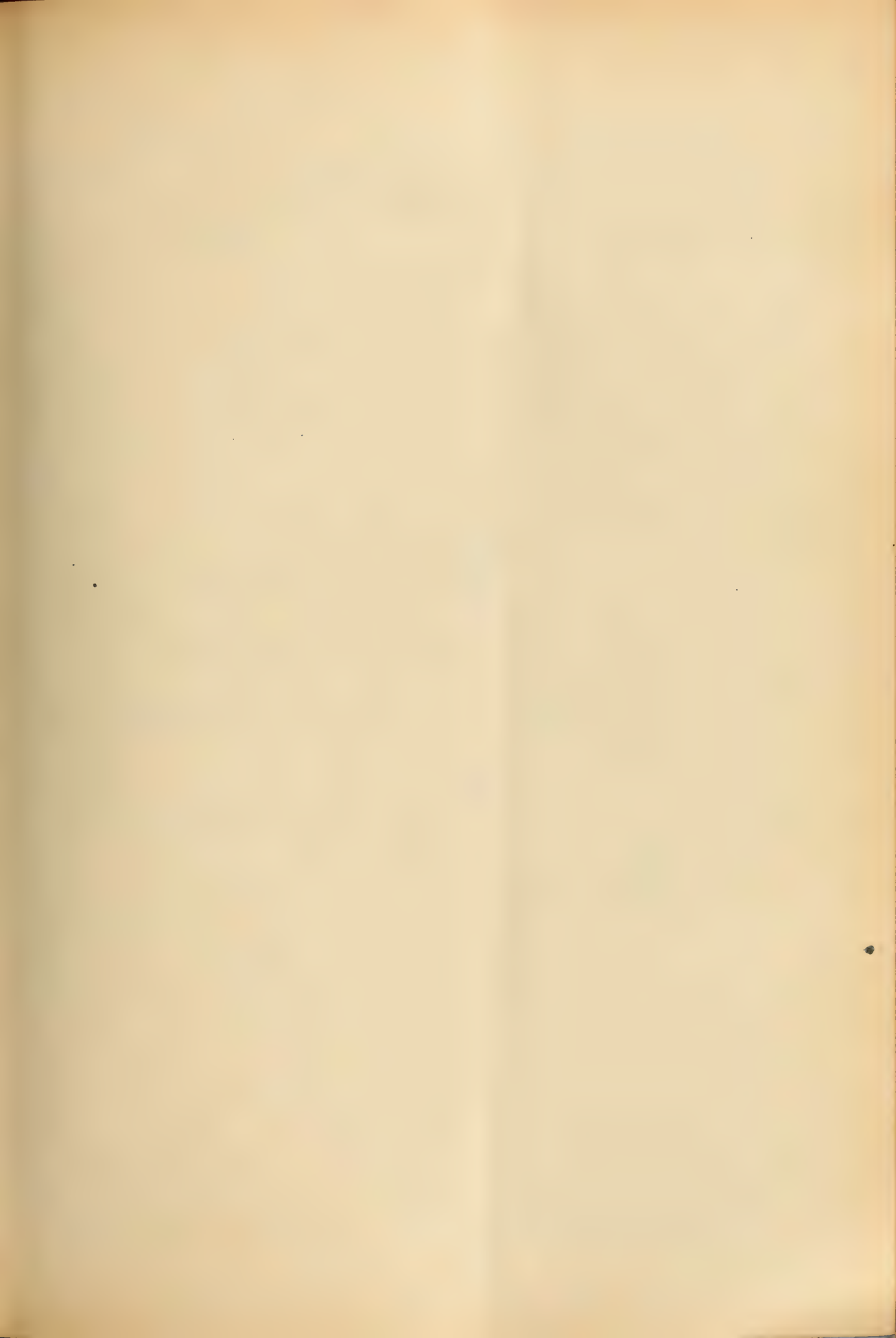


Fig. 6.



WITNESSES:
H. H. Leuby
H. H. Bumble

INVENTOR
Julius Wellner
BY
A. V. Group
ATTORNEY.

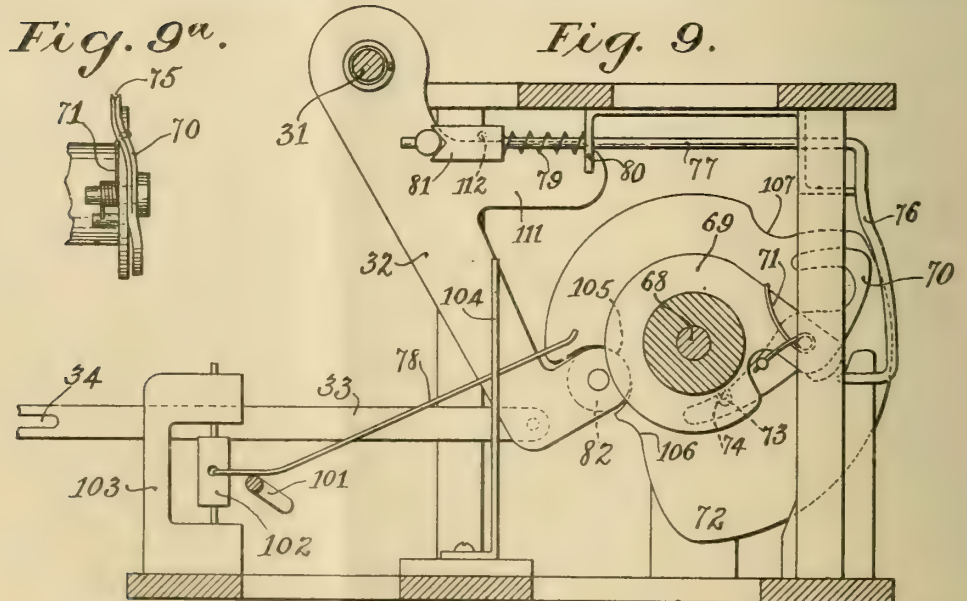
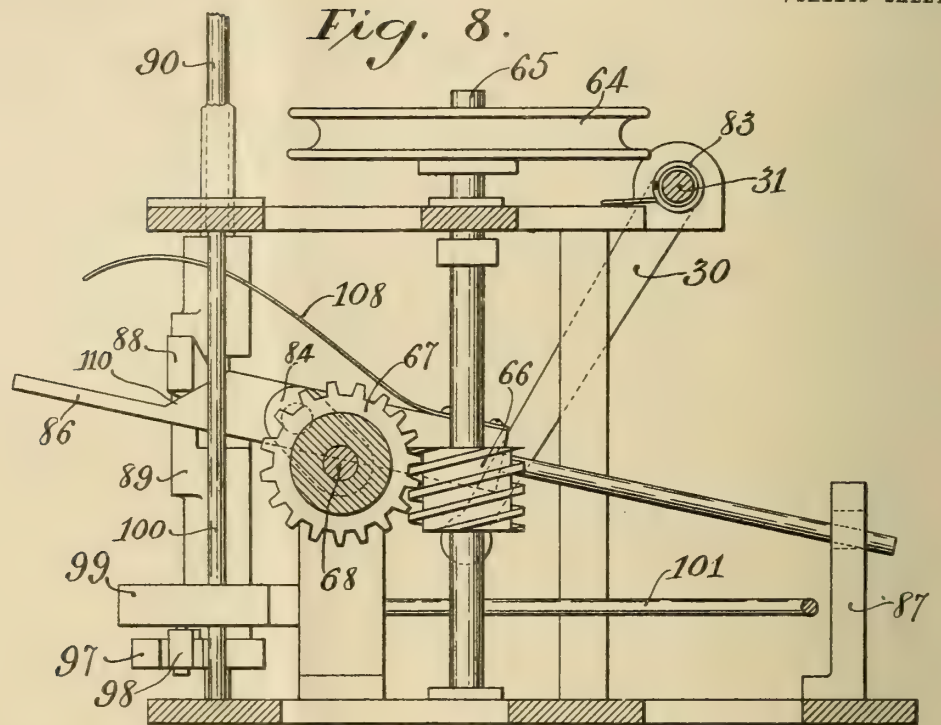


J. WELLNER.
SOUND REPRODUCING MACHINE.
APPLICATION FILED DEC. 15, 1903.

928,567.

Patented July 20, 1909.

7 SHEETS—SHEET 6.

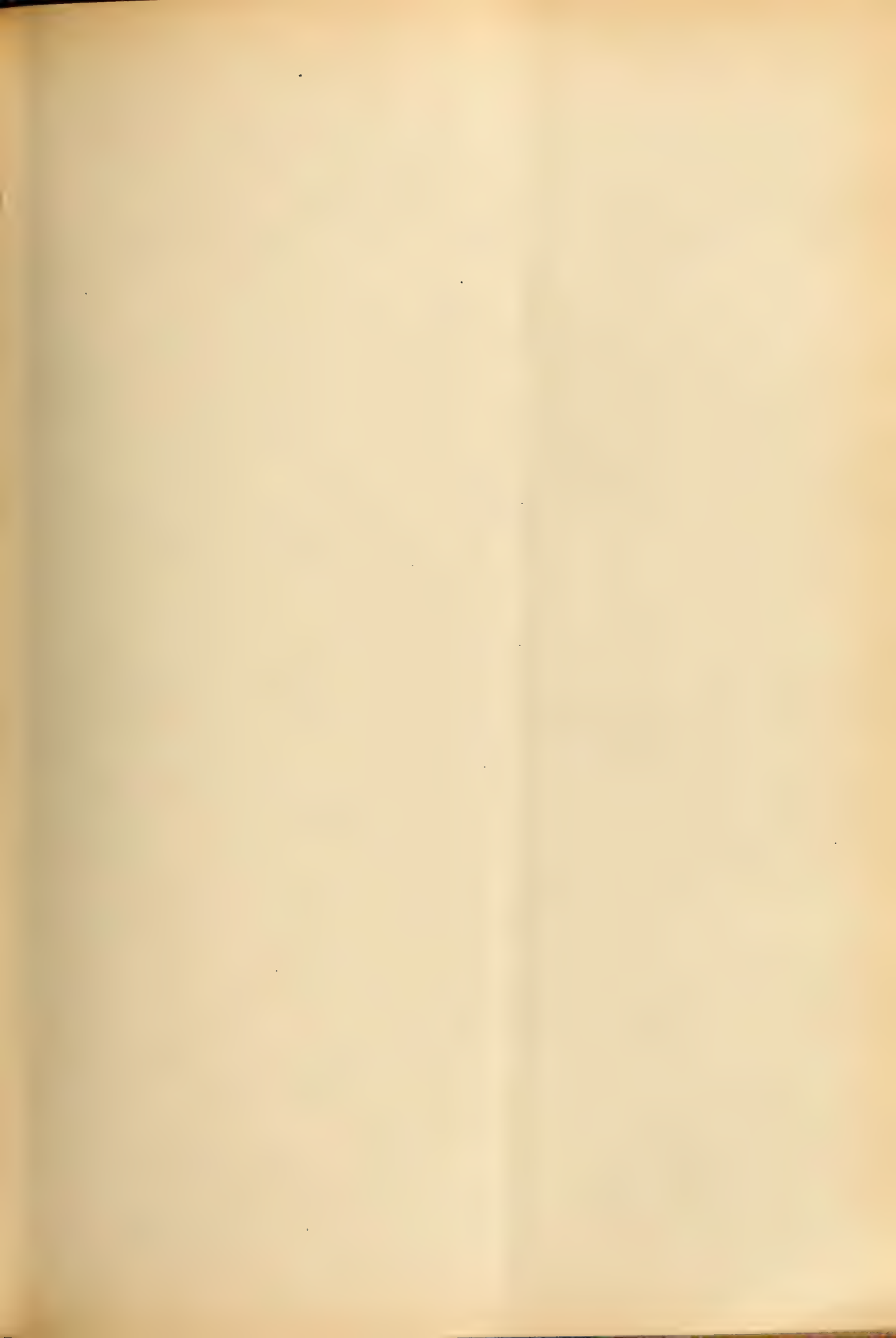


WITNESSES:

W. H. Canby
J. H. Gamble.

INVENTOR

Julius Wellner
BY
A. V. Trout
ATTORNEY.

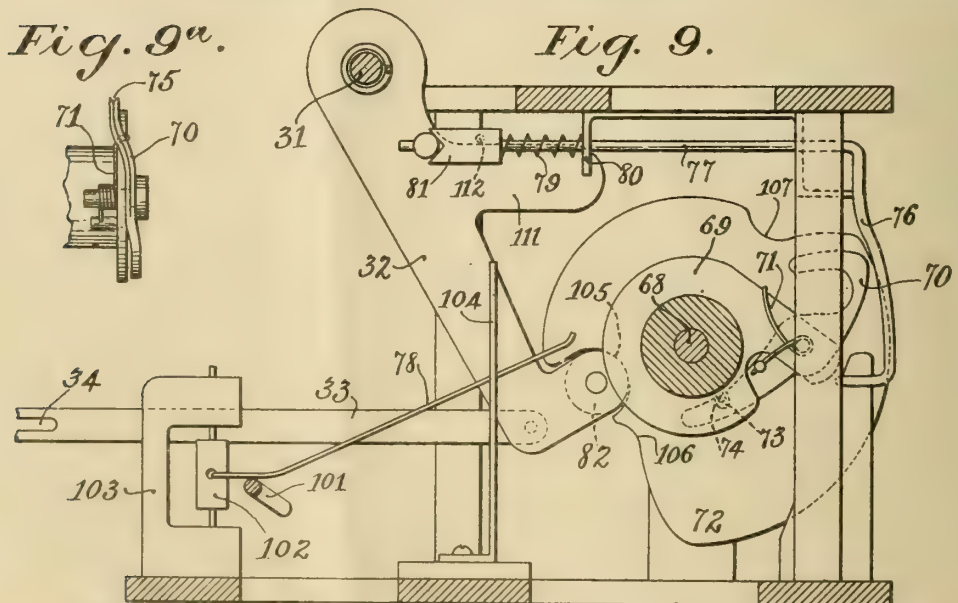
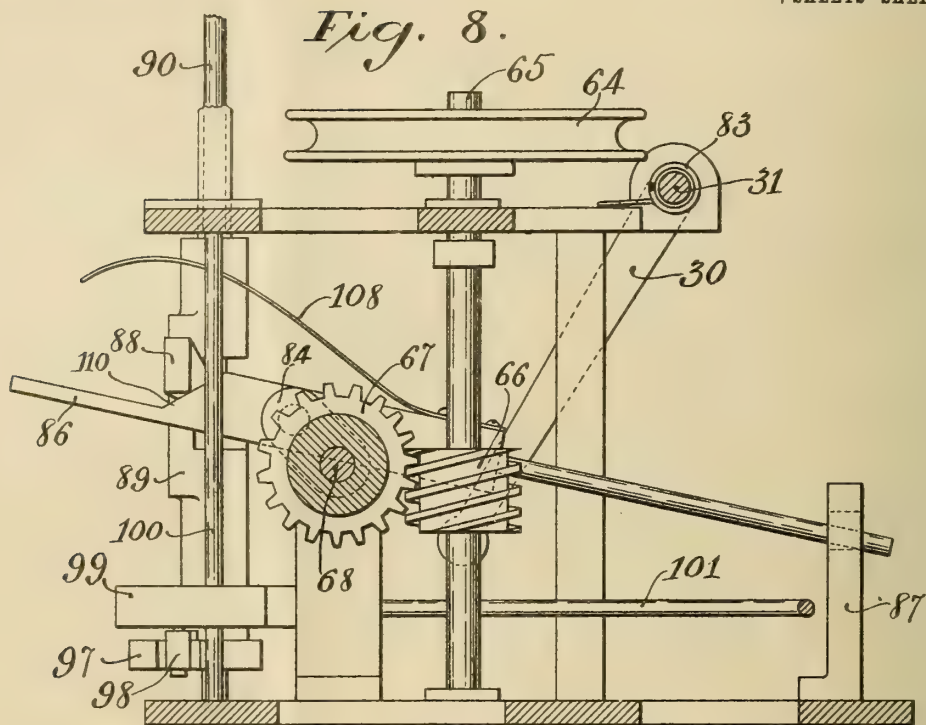


J. WELLNER.
SOUND REPRODUCING MACHINE.
APPLICATION FILED DEC. 15, 1903.

928,567.

Patented July 20, 1909.

7 SHEETS—SHEET 6.



WITNESSES:
H. H. Canby
J. H. Gamble.

INVENTOR
Julius Wellner
BY
A. V. Trout
ATTORNEY.



928,567.

Patented July 20, 1909.
7 SHEETS—SHEET 7.

Fig. 10.

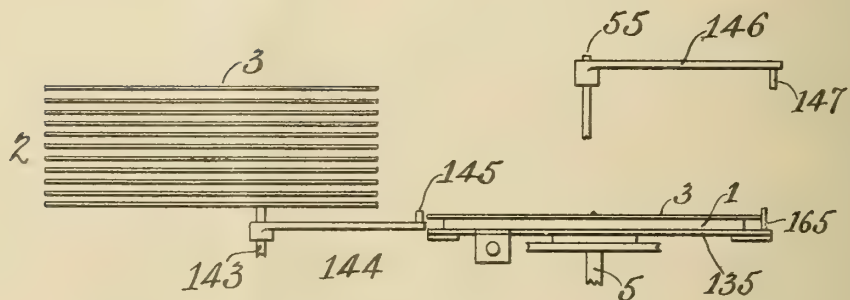


Fig. 11.

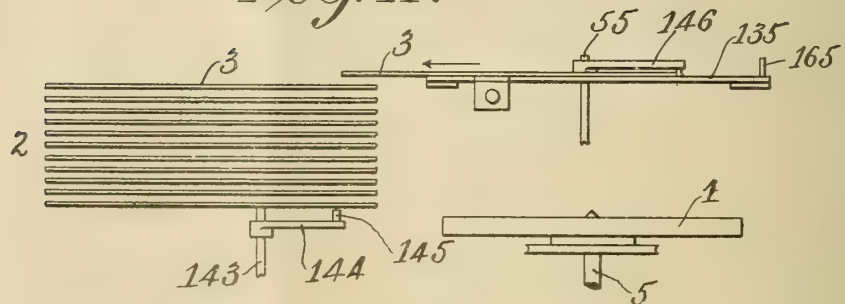
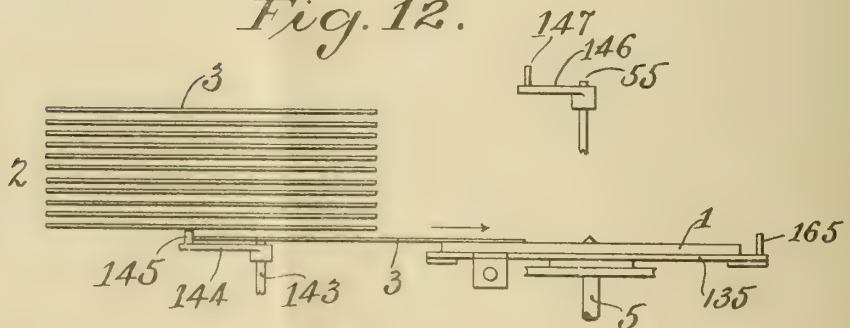


Fig. 12.



WITNESSES:

W. H. Leachby
J. H. Gamble

INVENTOR

Julius Wellner
BY
A. V. Gouge
ATTORNEY.

UNITED STATES PATENT OFFICE.

JULIUS WELLNER, OF PHILADELPHIA, PENNSYLVANIA.

SOUND-REPRODUCING MACHINE.

No. 928,567.

Specification of Letters Patent.

Patented July 20, 1909.

Application filed December 15, 1903. Serial No. 185,204.

To all whom it may concern:

Be it known that I, JULIUS WELLNER, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Sound-Reproducing Machines, of which the following is a specification.

This invention relates to sound reproducing machines.

The main object of the invention is to provide machines of this character with means whereby one of a plurality of records may be transferred from a suitable magazine or support to the rotatable record support, for the purpose of reproducing the record, and also to transfer the record from the rotatable support back to the magazine.

With this and other objects in view, the invention consists in the novel construction and combinations of parts all of which will be hereinafter fully described and claimed.

In the drawings Figure 1 is a side elevation of my improved sound reproducing machine. Fig. 2 is an end elevation thereof. Fig. 3 is a sectional plan view, showing the record magazine and turn-table removed. Fig. 3^a is a detail, in plan, of a jointed arm and the sound box. Fig. 4 is a sectional plan, as on the line 4—4 of Fig. 1. Fig. 5 is a detail of a part of the mechanism for supporting and lowering the records. Fig. 6 is a detail, in elevation, of a part of the automatic mechanism for stopping the machine, and adjuncts. Fig. 7 is a sectional plan view, as on the line 7—7 of Fig. 2. Figs. 8 and 9 are sectional elevations as on the line 8—9 of Fig. 7, Fig. 8 as seen from the dotted line arrow and Fig. 9 as seen from the full line arrow. Fig. 9^a is a detail of a part of Fig. 9, as seen from the right hand side of the latter figure. Figs. 10, 11 and 12 are diagrammatic views showing the series of records, the turn-table and different positions of the parts directly concerned in transferring the records from the series to the turn-table and back again; Fig. 10 showing the position of the parts while a record is being reproduced, Fig. 11 showing a record raised from the turn-table and being moved horizontally to the top of the series, and Fig. 12 showing the lowermost disk of the series being moved to and upon the turn-table.

1 designates a turn-table for supporting

and rotating the records which in the present instance, are the well known flat disks provided with the usual helical groove or composition to be reproduced; and 2 designates a magazine in which are arranged a series of superposed record disks 3.

By the operation of one of the parts of the mechanism hereinafter described, either manually, by a suitable coin controlled mechanism or in any other desirable manner, the machine is operated to reproduce the composition of the record disk upon the turn-table, to transfer the record disk from the turn-table to the top of the series of disks 3, and to transfer the lowermost disk 3 to the top of the turn-table or playing position, after which the machine is automatically stopped with its parts in position for a succeeding operation. Thus it will be observed that as the mechanism is successively operated, as above described, the record disks will be successively reproduced, one disk away from the groove thereof being reproduced at each operation of the machine.

The turn-table 1 is mounted on a vertical shaft 5 having its bearings in the main frame 6 and being provided with a bevel gear wheel 10 which is driven by a similar wheel 11 on a horizontal shaft 12. This shaft has affixed thereto a pulley 13 which is driven by a belt 14 actuated by a pulley 15 which is loosely mounted on a horizontal clutch shaft 16. Arranged adjacent to the pulley 15 is a pulley 17 which is also loosely mounted on the clutch shaft 16 and is driven by a belt 18 from a suitable motor 19 which, in the present instance is an electric motor. Fixed to the clutch shaft 16 is a collar 20 provided with a projecting pin 21, and mounted on the clutch shaft, between the collar 20 and the pulley 17, is a freely rotatable and laterally movable clutch member 22 comprising a pair of disks 23 and 24 connected together by a collar 25. The disk 24 carries a pin 26 which extends through and is engaged with the pulley 17 and is adapted to be engaged with a pin 27 projecting from the hub of the pulley 15; and the disk 23 is provided with a pin 28 which is adapted to be engaged with the pin 21. Thus it will be seen that when the clutch member 22 is shifted to engage the pin 26 with the pin 27, the turn-table 1 will be rotated by the motor 19; and when the clutch member is shifted to engage the pin 28 with the pin 21, thereby moving

the pin 26 from engagement with the pin 27, the turn-table will cease to rotate and the motor will rotate the clutch shaft 16.

When the machine is started, the clutch member 5 is shifted to engage the pin 26 with the pin 27 to rotate the turn-table 1, and, at the same time, the electric current is supplied to the motor. The preferred means to this end is as follows:—Fitted to the main frame 6 is a reciprocative bar 29 forming that part of the mechanism which may be moved outwardly either manually or automatically, as stated, to start the machine. The inner end of the bar 29 is connected to an arm 30 depending from a rock shaft 31. This shaft 31 is provided with an arm 32 which is connected to one end of a link 33 the other end of which is provided with a slot 34 into which extends a pin 35 carried by an arm 36 depending from a rock shaft 37 from which depends another arm 38. Pivoted to the arm 38 is one end of a bar 39 the other end of which is bifurcated for the reception of a pin 40 projecting from an arm 41 which is pivoted to the side frame, as at 42. The arm 41 is provided with an insulated extension 43 carrying two connected contact points 44 which, when the arm 41 is rocked to lower the extension 43, will enter two mercury contact cups 45 and thereby complete an electric circuit 46 to supply current to the motor 19. The bar 39 is provided with a roller 47 which is adapted to engage a projection 48 on a reciprocative plate 49 to hold the extension 43 of the arm 41 in the raised position. The plate 49 is provided with a slot 50 and is supported by a screw 51 projecting from the side frame and extending through the slot 50 in a manner to permit the lower edge of the plate 49 to be rocked outwardly for a purpose hereinafter explained. The projection 48 is held in engagement with the roller 47 by a spring 52 secured at one end to the plate 49 and at the other end to the main frame, the bar 39 taking against the side frame and limiting the movement of the plate. The lower edge of the plate 49 is provided with an off-set 53 into which extends one end of a bell-crank lever 54 which is loosely mounted on a vertical shaft 55. The other end of lever 54 is connected by a link 56 to the lower end of an arm 57 which is loosely mounted on and depends from the rock shaft 37. Projecting from the lower end of the arm 57 is a stud 58 carrying on its free end a roller 59 which is arranged between the disks 23 and 24 of the clutch member 22, to the end that, when the arm 57 is rocked, the clutch member 22 will be laterally shifted.

By the construction just described it will be seen that, when the bar 29 is drawn outwardly, the outer end of the bar 39 will be drawn inwardly, against the action of a suitable spring 60, thereby disengaging the

roller 47 from the projection 48 and permitting the extension 43 of the arm 41 to drop and complete the electrical circuit 46 to start the motor 19, the bar 39 being connected to the arm 38 sufficiently loose to permit it to rock with the arm 41. Immediately following the disengagement of the roller 47 from the projection 48, the spring 52 draws the plate 49 forward and the off-set 48 engages and rocks the bell-crank lever 54 which moves the link 56 against the action of a suitable spring 61 to rock the arm 57 which shifts the clutch member 22 to engage the pin 26 with the pin 27; whereupon the turn-table 1 starts to rotate.

The turn-table shaft 5 is provided with a pulley 62 which is connected by a belt 63 with a pulley 64 on the upper end of a vertical shaft 65. This shaft 65 carries a worm 66 in engagement with a worm wheel 67 which is mounted to rotate freely upon a horizontal shaft 68. The hub of the worm wheel 66 carries a projection 69 to which is pivoted a latch lever 70. The inner end of the lever 70 is, by the action of a suitable spring 71, held normally against the hub of a cam 72, hereinafter referred to, which is fixed to the shaft 68. The inner end of the lever 70 is provided with a notch 73 which is adapted to engage a projection 74 on the hub of the cam 72 and thereby lock the shaft 68 to rotate with the worm wheel 67. The outer end of the lever 70 is bent laterally, as shown in Fig. 9^a, and is provided in its edge with a cam groove 75 which, during the rotation of the shaft 68, is adapted to engage the lower end of an arm 76 depending from a horizontal rock shaft 77 and also to engage the free end of an arm 78 hereinafter referred to, in a manner to move the notch 73 from engagement with the projection 74. The arm 76 is held normally in position by the friction of a spring 79 engaging the bearing 80 of the shaft 77 and a collar 81 secured to said shaft. Bearing against the cam 72 is a roller 82 carried by the arm 32 hereinbefore referred to, a suitable spring 83 being provided to maintain the roller 82 in engagement with the cam.

The shaft 68 is provided with a crank arm 84 carrying a projecting pin 85 which extends through and supports one end of a bar 86, the other end of which extends freely through an opening in a lug 87 projecting from the frame, to the end that, when the shaft 68 is rotated, the bar 86 will be raised and lowered and, at the same time, longitudinally reciprocated. The bar 86 is arranged to engage the under side of the free end of an arm 88 the other end of which is pivoted to a vertically-arranged shaft 89. Extending through the upper portion of the shaft 89 and slidingly fitted thereto is a rod 90. The lower end of this rod 90 rests upon the arm 88, and resting upon the top of the

rod 90, is a horizontal arm 91 one end of which is pivoted to an extension 92 on the upper end of the shaft 89. The other end of the arm 91 is provided with an upwardly projecting forked end which engages a weighted arm 93 projecting from the sound box 94 which is of usual and well known construction. The sound box 94 is mounted on a telescopic tube support 95 in a manner to be partially rotatable to engage and disengage the stylus 96 from the record, and radially movable with respect to the record upon the turn-table to permit the inward movement of the stylus during its engagement with the groove of the record and its outward movement to its normal position for a succeeding operation.

The lower end of the vertical shaft 89 is provided with a bifurcated projecting arm 97 to which is fitted a block 98 pivoted to an arm 99 projecting from a vertical rock shaft 100, to the end that when the shaft 89 is rocked, the shaft 100 will also be rocked. The arm 99 carries a projection 101 provided with a curved end which is arranged to be moved back and forth beneath the arm 78, hereinbefore referred to, when the shaft 100 is rocked. One end of the arm 78 is horizontally pivoted to a block 102 which, in turn, is vertically pivoted to a bracket 103 on the main frame. The arm 78 rests normally upon the curved end of the projection 101 and its other or free end extends through an opening in a plate 104 projecting from the main frame, the free end of the arm 78 being arranged to engage the cam groove 75 in the lever arm 70.

The cam 72 is provided with a deep notch 105 and two other notches 106 and 107; and, prior to starting the machine, the roller 82 rests in the deep notch 105, the notch 73 of the lever 70 is in engagement with the projection 74, the lower end of the arm 76 is in position to engage the inner end of the cam groove 75, and the sound box occupies its normal position; that is, a position above the outer portion of the record disk upon the turn-table, the stylus being raised out of engagement with the disk. When the bar 29 is moved outwardly to start the machine; the arm 32 is rocked to disengage the roller 82 from the notch 105, and, immediately following the starting of the machine, the outward pull or pressure of the bar 29 is removed and the spring 83 moves the roller 82 into engagement with the notch 106. Just as the roller 82 enters the notch 106, the cam groove 75 in the lever 70 engages the arm 76 and thereby moves its notch 73 from engagement with the projection 74, whereupon the shaft 68 remains idle while the worm wheel 67 is turned a complete revolution to permit the turn-table to acquire the desired speed before engaging the stylus 96 with the groove of the record disk. It will be ob-

served that, as the end of the arm 76 traverses the groove 75, it is cammed out of position to reengage the inner end of the groove 75 and that, when the lever 70 again meets the arm 76, the side of the lever 70 engages the arm 76 and moves the latter still farther out of position; therefore, after the worm wheel 67 has made a complete revolution, the spring 71 causes the lever 70 to ride over and engage its notch 73 with the projection 74. This being done, the shaft 68 is turned by the worm wheel 66 about a half revolution, thereby causing the crank arm 84 to lower the bar 86, whereupon the arm 88, the rod 90 and the arm 91 are lowered by gravity, and the weighted arm 93 turns the sound box 94 to engage the stylus 96 with the record disk. It will be observed that the bar 86 is provided with a curved projection 108 which extends over the arm 86, and that the crank 84 not only lowers but also retracts the bar 86 during the half turn of the shaft 68. This retraction of the bar 86 causes the projection 108 to engage the arm 88 by friction and thereby turn the shaft 89 until the arm 91 carried thereby moves the sound box 94 inwardly to engage the stylus 96 with the outer turn of the groove of the record disk, whereupon the shaft 89 ceases to turn and the projection 108 passes idly over the arm 88. After the shaft 68 has been turned a half revolution, as above stated, the roller 82 engages the notch 107 to prevent further rotation of the shaft 68, and at the same time, the groove 75 of the lever 70 engages the free end of the arm 78 and rocks said lever to disengage its notch 73 from the projection 74 and thereby disconnect the shaft 68 from the worm wheel 67.

I have now reached what I term "the playing position;" that is, the record disk upon the turn table 1 is being rotated and the stylus 96 is traversing its groove to reproduce the composition, in the well known manner; and, at the same time, the stylus is moving toward the center of the disk. As the stylus 96 moves toward the center of the disk, the arm 91 is moved therewith in a manner to slowly turn the shaft 89 which, through the arms 97 and 99, slowly turns the shaft 100, thereby gradually moving the curved end of the projection 101 in the direction indicated by the arrow in Fig. 7. As the curved end of the projection moves in this direction, it engages the arm 78 by friction and tends to maintain the latter in the position shown; that is, against the wall of the opening in the plate 104. During each successive revolution of the worm wheel 67, while the composition is being reproduced, the free end of the arm 78 engages the lever 70 and prevents the notch 73 from engaging the projection 74; and each time the arm 78 engages the lever 70, it is cammed to one side by

the groove 75 and out of line with the inner end of said groove, but before the lever 70 again meets the arm 78, the latter is moved by the friction of the curved end of the projection 101 to its normal position to engage the inner end of the groove 75. Thus the arm 78 is rocked back and forth during the playing of the record. After the stylus has reached the inner end of the groove of the record disk, it ceases to move inwardly, and, consequently, the projection 101 also ceases to move; therefore, when the arm 78 is cammed to one side by the groove 75, it is not returned to its normal position by the projection 101; consequently, the notch 73 of the lever 70 is permitted to engage the projection 74 and lock the shaft 68 to rotate with the worm wheel 67 until the shaft 68 has been given another half revolution and returned to its original position, as follows:—The first movement of the shaft 68 causes the crank arm 84 to raise the bar 86 which raises the arm 88, the rod 90, the arm 91 and the weighted arm 93, thereby turning sound box 94 to disengage the stylus 96 from the record disk 3. This being done, the crank arm 84 moves the bar 86 longitudinally, thereby causing a shoulder 110 on the bar 86 to engage the arm 88 and turn the shaft 89 in a manner to cause the arm 91, carried by the shaft 89, to move the sound box 94 outwardly to a position beyond the outside line of the record disk, whereupon the roller 82 engages the deep notch 105 of the cam 72 and locks the shaft 68 against further rotation. As the shaft 89 is being turned to move the sound box 94 outwardly, the shaft 100 is also being turned to move the arm 93 and projection 101 in the reverse direction for a succeeding operation.

The arm 32 is provided with a projection 111 which, when the roller 82 enters the deep notch 105, is adapted to engage a pin 112 projecting from the shaft 77 and thereby move the arm 76 to its original position for reengagement by the lever 70.

Simultaneously with the stopping of the shaft 68, the clutch member 22 is shifted to disengage the pin 26 from the pin 27 and to engage the pin 28 with the pin 21, thereby preventing further rotation of the turntable 1 and shaft 65, and connecting the clutch shaft 16 to the pulley 17 to be rotated by the motor 19, as follows:—As the roller 82 enters the deep notch 105 of the cam 72, the shaft 31 and arm 32 carried thereby are rocked to cause the link 53 to engage the end of the slot 34 with the pin 35 and thereby actuate the arm 36 to rock the shaft 37, which, in turn, rocks the arm 38, carrying the bar 39, toward the plate 49. This operation causes the roller 47 to engage and move the bottom of the plate 49 outwardly until the off-set 53 escapes the end of the bell crank lever 54, thereby permitting the lever

54 to move, and the spring 61 to draw the link 56 in a manner to move the arm 57 to shift the clutch member 22 to disengage the pin 26 from the pin 27 and to engage the pin 28 with the pin 21, whereupon the clutch shaft 22 starts to rotate. The clutch shaft 16 is provided with a pinion 113 which, through a pair of idlers 114 and 115 mounted on a shaft 116, drives a gear wheel 117 secured to a cam shaft 118. By the mechanism actuated by the cam shaft 118, during one complete revolution thereof, the record disk upon the turn-table 1 is returned to the magazine 2, the lowermost record disk in the magazine is transferred to the turn-table 1, and the machine is automatically stopped with its various parts in position for a succeeding operation.

The magazine 2 comprises a bottom plate 119 and a top plate 120 supported by posts 121 rising from the bottom plate 119, the whole being supported upon the main frame 6. Extending between the plates 119 and 120 and journaled therein are three vertical rock shafts 122, 123 and 124. Secured to each of these shafts 122, 123 and 124 are the lugs 125 of a bar 126 provided with a vertically-arranged series of inwardly-projecting pins 127 which are adapted to support the record disks 3 one above the other and in spaced relation to each other; and slidably fitted to each shaft 122, 123 and 124, so as to be vertically movable thereon, are the lugs 128 of a bar 129 also provided with a vertically-arranged series of inwardly-projecting pins 130 which are adapted to support the record disks 3 similarly to the pins 127. Each bar 129 is held normally raised with its upper lug 128 in engagement with the upper lug 125 of the adjacent bar 126 by the action of a suitable spring 131. When the bars 129 occupy the normal or raised position, the pins 130 occupy the same horizontal position as the pins 127, and when the bars 129 are depressed, the pins 130 move down a distance equal to the space between two adjacent pins 127. The position of the bars 126 and 129, and pins 127 and 130 is such that when the shafts 122, 123 and 124 are rocked back and forth the pins 127 and 130 may be alternately inserted between and withdrawn from the disks 3. Thus it will be seen that when the shafts 122, 123 and 124 are rocked to engage the pins 130 with the record disks 3, the weight of said disks will depress the springs 131 and lower the entire series of records 3 one step; and when said shafts are again rocked to engage the pins 127 with the disks 3, the lowermost disk 3 will be deposited upon the plate 119 and the springs 131 will raise the bars 129 to the normal position for a succeeding operation.

The upper plate 120 is provided on its under side with lateral, horizontally disposed guideways 132 adapted to receive and

guide a record disk to a position where it will rest upon the uppermost pins 127; and the lower plate 119 is provided with similar guideways 133 arranged in line with the top of the turn-table 1 and adapted to guide a record disk from the plate 119 to the top of the turn-table 1.

Surrounding the turn-table 1 is a frame 135 which is vertically movable to a position in line with the guideways 132 and to a position slightly below the top of the turn-table 1. This frame 135 is slidably fitted to guide rods 136 projecting vertically from the main frame 6. The frame 135 is pivotally connected to the upper ends of a pair of links 137 the lower ends of which are pivoted to arms 138 projecting from the respective ends of a rock shaft 139 which has its bearings in the main frame. The rock shaft 139 is provided with an arm 140 carrying on its free end a roller 141 which is engaged by a cam 142 fixed to the cam shaft 118, to the end that, when the cam shaft 118 is turned, the frame 135 will be raised and lowered by the action of the cam 142 upon the connections just described.

Fixed to a vertical rock shaft 143 is a horizontally extending arm 144 provided with an upwardly projecting pin 145, and fixed to the shaft 55 hereinbefore referred to, which is also a rock shaft, is a horizontally extending arm 146 provided with a downwardly projecting pin 147. The pin 145 is arranged to move through the bottom of the magazine 2 and the pin 147 is arranged to move through a plane above the turn-table 1 and in line with the top of the magazine 2 when the shafts 55 and 143 are rocked. The shafts 55 and 143 are provided with arms 148 and 149 respectively, which are connected by a link 150, and the shaft 55 is provided with an arm 151 which is connected by a link 152 to an arm 153 projecting from the outer end of a rock shaft 154 having its bearings in the main frame. The inner end of the shaft 154 is provided with an arm 155 carrying on its free end a roller 156 which is engaged by a cam 157 on the cam shaft 118. When the cam shaft 118 is turned, the shafts 55 and 143 are rocked in unison by the action of the cam 157 on the connections just described, and, in consequence of which, the pin 145 is moved from and toward the turn-table 1 and through the lower portion of the magazine 2, and the pin 147 is moved toward and from the upper portion of the magazine, for a purpose hereinafter explained.

The rock shaft 143 is provided with an arm 158 which is connected by a link 159 to a bell crank lever 160 secured to the rock shaft 122. This lever 160 is connected by links 161 and 162 to arms 163 and 164 secured to the rock shafts 123 and 124, respectively, to the end that, when the arms 144

and 146 are shifted to return a record disk to the magazine, the shafts 122, 123 and 124 will be rocked to engage the pins 127 with the disks 3, and, when the arms 144 and 146 are shifted to move a record from the magazine to the turn-table 1, the shafts 122, 123 and 124 will be rocked to engage the pins 130 with the disks 3. Thus it will be seen that, each time a disk is moved to the turn-table 1, the disks 3 in the magazine are lowered one step.

The operation of returning the record disk upon the turn-table 1 to the top of the magazine 2 and replacing it by the lowermost disk in the magazine may be briefly described as follows:--During the initial movement of the cam shaft 118, the cam 142 engages the roller 141 of the arm 140 and rocks the shaft 139, which, through the arms 138 and links 137, raises the frame 135. The frame 135 engages and carries therewith the record disk from the top of the turn-table 1 to a position in line with the guideways 132. The cam 157 now acts upon the roller 156 of the arm 155 and rocks the shaft 154 which, through its connections, rocks the vertical shafts 55 and 143 thereby moving the arm 146 toward the top of the magazine, and moving the arm 144 from a position adjacent to the turn-table 1 through and beyond the lower portion of the magazine 2. This operation causes the pin 147 to engage and move the record disk from the frame 135 and through the guide-ways 132 to the top of the magazine where it is deposited from the uppermost pins 127. During this same movement of the arms 144 and 146, the shafts 122, 123 and 124 are rocked to lower the record disks 3 one step and deposit the lowermost disk 3 upon the plate 119 as previously explained. The continued movement of the cam 157 causes the arms 144 and 146 to be moved in the reverse direction, during which operation the arm 144 is moved to its original position, and the pin 145 engages the disk 3 upon the plate 119 and moves it through the guideways 133 and onto the turn-table 1. After the disk 3 has entered the guideways 133 the frame 135 is lowered under the influence of the cam 142, and, before the lowermost disk in the magazine has been moved to the turn-table 1, the frame 135 has reached its lowered or original position for a succeeding operation. The frame 135 is provided with upwardly projecting stop pins 165 which limit the movement of the disk by the pin 145, and thereby insure the stoppage of the disk centrally upon the turn-table 1; and the posts 121 serve as a similar stop for the disks as they are returned to the magazine 2 by the pin 147. Extending between the plates 119 and 120 is a rod 131 from which projects a plate 131^a which is adapted to act in conjunction with the posts 121 to maintain the record disks 3 in vertical

alignment when the pins 127 and 130 are alternately engaged with said disks. It will be observed that the top of the plate 134^a is below the plate 120 and that the bottom of the plate 134^a is above the plate 119, thereby permitting the entrance of the disks to the top of the magazine and the exit of the disks from the bottom of the magazine as previously explained. When the sound box 94 was moved outwardly from the record disk upon the turn-table 1, as previously explained, it was also moved beyond the outside line of the frame 135, in order to permit the latter to be raised and lowered in returning the disk to the magazine; therefore, in order to return the sound box to its original position, that is, a position above the edge of the record disk upon the turn-table 1, I provide the following:—The rock shaft 55 is provided with a jointed arm 166; the respective members of which are held normally at substantially right angles to each other by a suitable spring 167 as shown in Fig. 3^a. The free end of the arm 166 is forked, and one side of the forked end extends beyond the other side thereof. As the arms 144 and 146 are swung to return a record disk to the magazine 2, the outer end of the jointed arm 166 engages a pin 168 projecting upwardly from the sound box 94, and the arm 166 yields against the action of the spring 167 until the short side of its forked end escapes the pin 168 and its long side is engaged therewith. Then, as the arms 144 and 146 are moved in the reverse direction, the arm 166 straightens out with its forked end engaging the pin 168 and forces the sound box 94 to its original position or above the edge of a record disk which, at the same time, is being moved to the top of the turn-table 1.

I shall now proceed to describe the mechanism for automatically cutting off the supply of current to the motor 19, and thereby stopping the machine.

The cam shaft 118 is provided with a cam 169 which is adapted to engage an arm 170 projecting from a horizontal rock shaft 171. The outer end of the shaft 171 carries an upwardly projecting arm 172 which is pivoted at its upper end to the plate 49 hereinbefore referred to. As the cam shaft 118 is turned to effect the transfer of record disk, the cam 169 engages the arm 170 and rocks the shaft 171, thereby causing the arm 172 to move the plate 49 against the action of the spring 52 to reengage the off-set 53 with the lever 54 and to permit the spring 60 to move the bar 39 to return the roller 41 to a position to be engaged by the projection 48 of the plate 49. Just before the cam shaft 118 completes its revolution, the cam 169 escapes the arm 170 and permits the spring 52 to return the plate 49 to its original position, the plate 49 fall-

ing by gravity to reengage the off-set 53 with the lever 54. As the plate 49 returns to its original position, the projection 48 engages the roller 47 and rocks the arm 41 to lift its extension 43 and contact points 44 from the mercury contact cups 45 thereby breaking the electric circuit 46 and stopping the machine with all its parts occupying their original positions for a succeeding operation.

While I have herein shown and described my invention in a desirable form yet I desire it to be understood that I do not limit myself to this particular construction as the same may be greatly modified without departing from the invention.

I claim—

1. In a sound reproducing machine, the combination of the frame thereof, a plurality of record disks supported one above the other in vertical series, means operative to move a record disk horizontally from said series into a playing position, means for rotating said record disk when in the playing position, and a sound reproducing device arranged to coact with said record when in the playing position.

2. In a sound reproducing machine, the combination of the frame thereof, a plurality of record disks supported one above the other in vertical series, means operative to move a record disk from said series into a playing position and from the playing position back to the series, means for rotating said record disk when in the playing position, and a sound reproducing device arranged to coact with said record when in the playing position.

3. In a sound reproducing machine, the combination of the frame thereof, a plurality of record disks supported one above the other in vertical series, means for automatically moving a record disk from said series into a playing position, means for rotating said record disk when in the playing position, and a sound reproducing device arranged to coact with said record when in the playing position.

4. In a sound reproducing machine, the combination of the frame thereof, a plurality of record disks supported one above the other in vertical series, means for automatically moving a record disk from said series into a playing position, and from the playing position back to the series, means for rotating said record disk when in the playing position, and a sound reproducing device arranged to coact with said record when in the playing position.

5. In a sound reproducing machine, the combination with a rotatable record support, rotating means therefor, the sound box, and the stylus, of a magazine, means for automatically transferring a record from the

magazine to the support, and means for automatically transferring a record from the support to the magazine.

6. In a sound reproducing machine, the combination with a rotatable record support, rotating means therefor, the sound box, and the stylus, of a magazine, means for automatically transferring a record disk from the magazine to the support, and means for automatically transferring a record disk from the support to the magazine, and means for automatically stopping the machine.

7. In a sound reproducing machine, the combination with a rotatable record disk support, rotating means therefor, the sound box, and the stylus, of a plurality of record disks supported in vertical series, means for transferring the lowermost disk of the series to the support, and means for transferring a record disk from the support to the top of the series.

8. In a sound reproducing machine, the combination with a rotatable record disk support, rotating means therefor, the sound box, and the stylus, of a plurality of record disks supported in vertical series, means for transferring the lowermost disk of the series to the support, means for transferring a record disk from the support to the top of the series, and means for automatically stopping the machine.

9. In a sound reproducing machine, the combination with a rotatable record disk support, rotating means therefor, the sound box, and the stylus, of a plurality of record disks supported in vertical series, means for transferring the lowermost disk of the series to the support, means for transferring a record disk from the support to the top of the series, and means for lowering the series.

10. In a sound reproducing machine, the combination with a rotatable record disk support, rotating means therefor, the sound box and the stylus, of a plurality of record disks arranged in vertical series, a movable member provided with means adapted to engage and support the disks, a depressible member provided with means adapted to engage and support the disks, said depressible member also adapted to be depressed by the weight of the disks, means for alternately engaging said movable member and depressible member with the disks and thereby intermittently lower the disks, means for transferring the lowermost disk of the series to the support, and means for transferring a record disk from the support to the top of the series.

11. In a sound reproducing machine, the combination with a rotatable record disk support, rotating means therefor, the sound box, and the stylus, of a plurality of record disks arranged in vertical series, a set of bars pivoted to rock horizontally and pro-

vided with projections pins adapted to support said disks, a set of depressible bars also pivoted to rock horizontally and provided with projections pins adapted to support said disks, means for rocking both sets of bars to alternately engage their respective pins with the record disks and thereby intermittently lower said disks, means for transferring the lowermost disk of the series to the support, and means for transferring a record disk from the support to the top of the series.

12. In a sound reproducing machine, the combination with a rotatable record support, rotating means therefor, the sound box and the stylus, of a magazine, a reciprocative frame adapted to carry a record from the support, means for reciprocating the frame, means for transferring a record from the frame to the magazine, and means for transferring a record from the magazine to the support.

13. In a sound reproducing machine, the combination with a rotatable record support, rotating means therefor, the sound box and the stylus, of a plurality of records supported in vertical series, with the lowermost record substantially in alinement with said support, a vertically reciprocative frame adapted to carry a record from the support and into substantial alinement with the top of the series, means for transferring the lowermost record of the series to said support, and means for transferring a record from the frame to the top of the series.

14. In a sound reproducing machine, the combination with a rotatable record support, rotating means therefor, the sound box and the stylus, of a plurality of records supported in vertical series with the lowermost record substantially in alinement with said support, a vertically reciprocative frame adapted to carry a record from the support and into substantial alinement with the top of the series, means for transferring the lowermost record of the series to said support, means for transferring records from the frame to the top of the series, and means for lowering the series.

15. In a sound reproducing machine, the combination with a rotatable record support, a rotating means therefor, the sound box and the stylus, of a plurality of records supported in vertical series with the lowermost record substantially in alinement with said support, a vertically reciprocative frame adapted to carry a record from the support and into substantial alinement with the top of the series, a horizontally reciprocative arm adapted to move a record from the frame to the top of the series, a horizontally reciprocative arm adapted to move the lowermost record of the series to said support, and means for reciprocating said arms.

16. In a sound reproducing machine, the combination with a rotatable record support, rotating means therefor, the sound box and the stylus, of a plurality of records supported in vertical series with the lowermost record substantially in alinement with said support, a vertically reciprocative frame adapted to carry a record from the support and into substantial alinement with the top of the series, a horizontally reciprocative arm adapted to move a record from the frame to the top of the series, a horizontally reciprocative arm adapted to move the lowermost record of the series to said support, means for reciprocating said arms, and means for lowering the series of records.

17. In a sound reproducing machine, the combination with a rotatable record support, rotating means therefor, the sound box and stylus, of a magazine, means for transferring a record from the support to the magazine, means for transferring a record from the magazine to the support, automatic means for independently stopping the rotation of the support after the stylus has traversed the record groove, and means for automatically stopping the machine after a record has been transferred from the magazine to the support.

18. In a sound reproducing machine, the combination with a rotatable record support, rotating means therefor, the sound box, and the stylus, of a cam shaft, means operatively connected to the cam shaft for transferring records from the support to the magazine and from the magazine to the support, a clutch member, rotating means therefor, and means for alternately connecting said clutch member to the rotating means of the support and the cam shaft.

19. In a sound reproducing machine, the combination with a rotatable record support, rotating means therefor, the sound box, and the stylus, of a cam shaft, means operatively connected to the cam shaft for transferring records from the support to the magazine and from the magazine to the support, a clutch member, rotating means therefor, means for automatically disconnecting the clutch member from the rotating means of the support and connecting said member to actuate the cam shaft, and means for automatically stopping the machine.

20. In a sound reproducing machine, the combination with a rotatable record support, rotating means therefor, the sound box, and the stylus, of a magazine, means for automatically transferring a record from the magazine to the support and from the support to the magazine, and means for moving the stylus into and out of operative position.

21. In a sound reproducing machine, the combination with a rotatable record sup-

port, rotating means therefor, the sound box, and the stylus, of a magazine, means for automatically transferring a record from the magazine to the support and from the support to the magazine, means for moving the stylus into and out of operative position, and means for automatically stopping the machine.

22. In a sound reproducing machine, the combination with a rotatable record support, rotating means therefor, the sound box, and the stylus, of a magazine, means for automatically transferring a record from the magazine to the support and from the support to the magazine, means for stopping the rotation of said support during the transfer of records, and means for moving the stylus into and out of operative position.

23. In a sound reproducing machine, the combination with a rotatable record support, rotating means therefor, the sound box, and the stylus, of a magazine, means for automatically transferring a record from the magazine to the support and from the support to the magazine, means for stopping the rotation of said support during the transfer of records, means for moving the stylus into and out of operative position, and means for automatically stopping the machine.

24. In a sound reproducing machine, the combination with a rotatable record support, rotating means therefor, the sound box, and the stylus, of a magazine, means for automatically transferring a record from the magazine to the support and from the support to the magazine, means for moving the stylus into and out of operative position, means under the control of the inward movement of the stylus for stopping the rotation of said support, and means for setting in motion the means for transferring the record disks.

25. In a sound reproducing machine, the combination with a rotatable record support, rotating means therefor, the sound box, and the stylus, of a magazine, means for automatically transferring a record from the magazine to the support and from the support to the magazine, means for moving the stylus into and out of operative position, means, under the control of the inward movement of the stylus for stopping the rotation of said support, means for setting in motion the means for transferring the records, and means for automatically stopping the machine.

26. In a sound reproducing machine, the combination with a rotatable record support, rotating means therefor, the sound box, and the stylus, of a magazine, means for automatically transferring a record from the magazine to the support and from the support to the magazine, means for moving

the stylus into and out of operative position, means under the control of the inward movement of the stylus for stopping the rotation of said support, means under the control of the inward movement of the stylus for setting in motion the means for transferring the records, and means for automatically stopping the machine after the transfer of records.

27. In a sound reproducing machine, the combination with a rotatable record support, the sound box, and the stylus, of a motor, a magazine, means for rotating said support, means for transferring a record from the magazine to the support and from the support to the magazine, means for operatively connecting the motor to drive the first and second named means alternately, and means for moving the stylus into and out of operative position.

28. In a sound reproducing machine, the combination with a rotatable record support, the sound box, and the stylus, of a motor, a magazine, means for rotating said support, means for transferring a record from the magazine to the support and from the support to the magazine, means for operatively connecting the motor to drive the first and second named means alternately, means for moving the stylus into and out of operative position, and means for automatically stopping the motor.

29. In a sound reproducing machine, the combination with a rotatable record support, the sound box, and the stylus, of an electric motor, an electric circuit therefor, a magazine, means for rotating said support, means for transferring a record from the magazine to the support and from the support to the magazine, means for operatively connecting the motor to drive the first and second named means, and means for automatically breaking the electric circuit.

30. In a sound reproducing machine, the combination with a rotatable record support, the sound box, and the stylus, of a motor, a magazine, means operatively connected to the motor for rotating said support, means operatively connected to the motor for transferring a record from the magazine to the support and from the support to the magazine, and means for moving the stylus into and out of operative position.

31. In a sound reproducing machine, the combination with a rotatable record support, the sound box, and the stylus, of a motor, a magazine, means operatively connected to the motor for rotating said support, means operatively connected to the motor for transferring a record from the magazine to the support and from the support to the magazine, means for moving the stylus into and out of operative position, and means for automatically stopping the motor.

32. In a sound reproducing machine, the combination with a rotatable record support, the sound box, and the stylus, of a motor, a magazine, means operatively connected to the motor for rotating said support, means operatively connected to the motor for transferring a record from the magazine to the support and from the support to the magazine, means for moving the stylus into and out of operative position, and means for stopping the rotation of said support during the transfer of records.

33. In a sound reproducing machine, the combination with a rotatable record support, the sound box, and the stylus, of a motor, a magazine, means operatively connected to the motor for rotating said support, means operatively connected to the motor for transferring a record from the magazine to the support and from the support to the magazine, means for moving the stylus into and out of operative position, means for stopping the rotation of said support during the transfer of records, and means for automatically stopping the motor.

34. In a sound reproducing machine, the combination with a rotatable record support, rotating mechanism therefor, the sound box, and the stylus, of a magazine, a clutch shaft, a cam shaft, gearing between the clutch shaft and cam shaft, means operatively connected to the cam shaft for transferring a record disk from the magazine to the support and from the support to the magazine, a rotatable clutch member, means for alternately engaging said member with said rotating mechanism and clutch shaft, and means for moving the stylus into and out of operative position.

35. In a sound reproducing machine, the combination with a rotatable record support, rotating mechanism therefor, the sound box, and the stylus, of a magazine, a clutch shaft, a cam shaft, gearing between the clutch shaft and cam shaft, means operatively connected to the cam shaft for transferring a record disk from the magazine to the support and from the support to the magazine, a clutch member, rotating means therefor, means for alternately engaging said member with said rotating mechanism and clutch shaft, means for moving the stylus into and out of operative position, and means for automatically stopping the rotation of said member.

36. In a sound reproducing machine, the combination with a rotatable record support, rotating mechanism therefor, the sound box, and the stylus, of a magazine, a clutch shaft, gearing between the clutch shaft and cam shaft, means operatively connected to the cam shaft for transferring a record disk from the magazine to the support and from the support to the magazine, a clutch member, rotating means therefor, means for alternately engaging said member with said ro-

tating mechanism and clutch shaft, means for moving the stylus into and out of operative position, and means under the control of the cam shaft for automatically stopping the rotation of said member.

37. In a sound reproducing machine, the combination with a rotatable support, a grooved phonograph record thereon, means for rotating the support, the sound box, and the stylus, of means for moving the stylus into engagement with the record away from the groove thereof, and means for moving the stylus into engagement with the groove of the record after it has first been engaged with the record.

38. In a sound reproducing machine, the combination with a rotatable record support, means for supporting a series of records, and means adapted to be operated to shift a record horizontally from the series to the support.

39. In a sound reproducing machine, the combination with a rotatable record support, means for supporting a series of records and means adapted to be operated to shift a record from the support to the series.

40. In a sound reproducing machine, the combination with a rotatable record support, means for supporting a series of records and means adapted to be operated to shift a rec-

ord from the series to the support and from the support to the series.

41. A machine comprising a carrier adapted to support a plurality of sound records, a rotary record support in proximity to said carrier and means operative to shift a record from the carrier to the support and from the support to the carrier as described.

42. In a sound reproducing machine, the combination with a record support, means for supporting a series of records, means operative to shift a record from the series to the support and means automatically operative to shift a record from the support to the series.

43. In a sound reproducing machine, the combination with the record support, means for supporting a series of records, means operative to shift a record from the series to the support, means automatically operative to shift a record from the support to the series and means for automatically stopping the machine.

In testimony whereof I affix my signature in presence of two witnesses.

JULIUS WELLNER.

Witnesses:

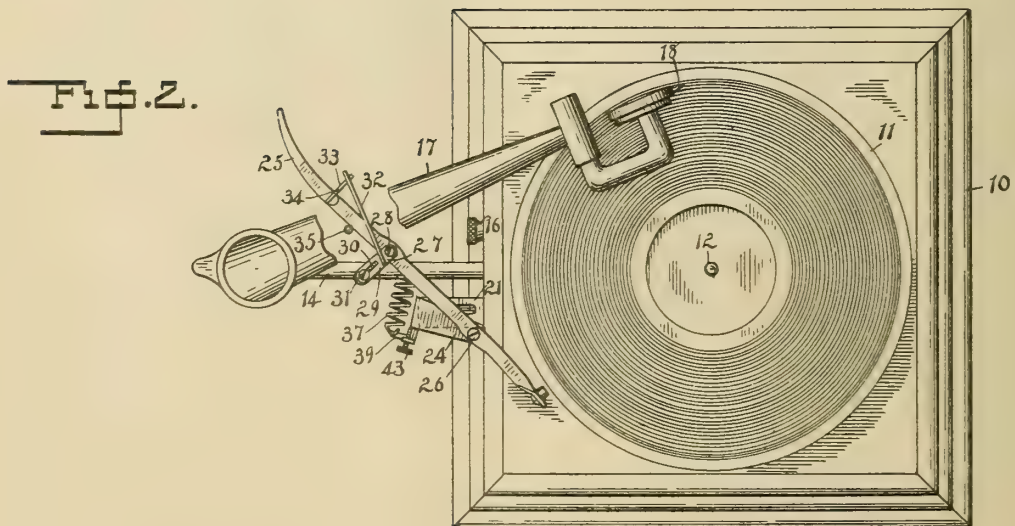
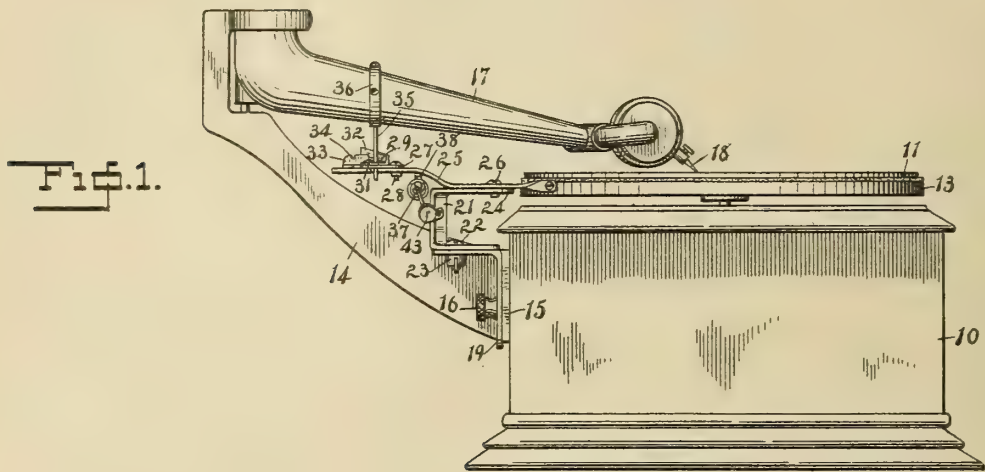
ANDREW V. GROUPE,
RALPH H. GAMBLE.

F. SHEPPY.
FEEDING DEVICE AND BRAKE FOR SOUND REPRODUCING MACHINES.
APPLICATION FILED MAY 27, 1907.

929,253.

Patented July 27, 1909.

2 SHEETS—SHEET 1.



WITNESSES:

Matthew J. Marty

C. F. Bassett

INVENTOR

Fredrick Sheppy

By Fredrick Benjamin

ATTY.

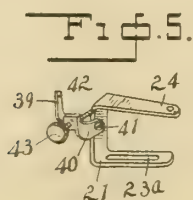
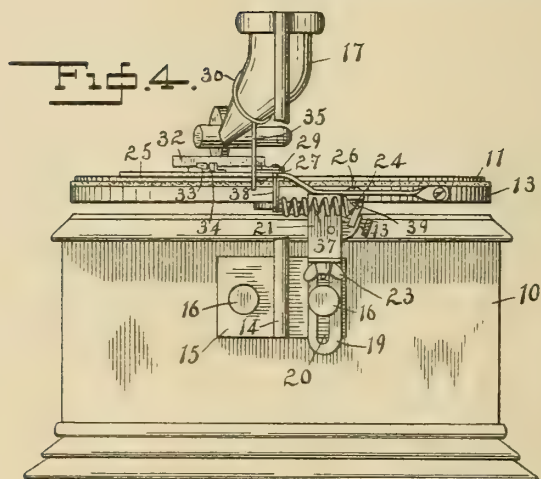
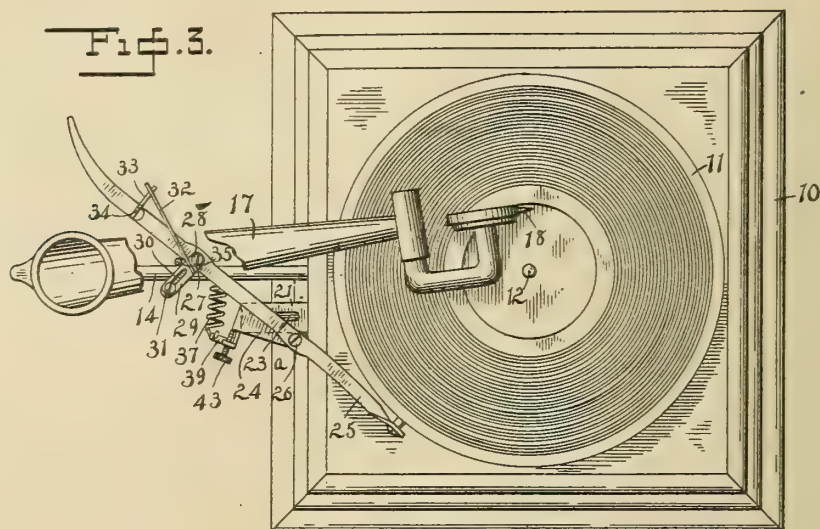


F. SHEPPY.
FEEDING DEVICE AND BRAKE FOR SOUND REPRODUCING MACHINES.
APPLICATION FILED MAY 27, 1907.

929,253.

Patented July 27, 1909.

2 SHEETS—SHEET 2.



WITNESSES:

Mathew J. Marty

C. F. Bassett

INVENTOR

Fredrick Sheppy

By

Fredrick Benjamin
ATTY.

UNITED STATES PATENT OFFICE.

FREDERICK SHEPPY, OF CHICAGO, ILLINOIS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO HAWTHORNE & SHEBLE MANUFACTURING COMPANY, OF PHILADELPHIA, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

FEEDING DEVICE AND BRAKE FOR SOUND-REPRODUCING MACHINES.

No. 929,253.

Specification of Letters Patent.

Patented July 27, 1909.

Application filed May 27, 1907. Serial No. 375,817.

To all whom it may concern:

Be it known that I, FREDERICK SHEPPY, a subject of the King of Great Britain, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Feeding Devices and Brakes for Sound-Reproducing Machines, of which the following is a specification.

My invention relates to sound reproducing machines and has special reference to devices for automatically stopping the movement of the record simultaneously with the completion of the reproduction.

My appliance is especially applicable to that class of apparatus commonly termed talking machines, the appliance itself being known as a brake.

A very serious disadvantage encountered while operating any form of talking machine is the inability to judge properly of the exact moment when the sound reproduction will cease. This fact requires that there should be a constant supervision of the mechanical movements and even when close attention is given thereto it is found difficult to terminate the movement of the record synchronously with the cessation of the sound production.

The chief objects of my invention are to provide a brake for talking machines that will automatically stop the record movement by frictional contact of the brake member therewith at the termination of the sound reproduction; to provide an automatic record brake for talking machines that can be readily attached to the instrument without disfiguring the casing or marring the finish in any way; and to produce an effective automatic brake for the purpose stated that is so designed that it will be equally effective when applied to instruments of different sizes.

I accomplish the above and other minor objects by the employment of the apparatus illustrated in the accompanying drawings which form a part of this specification, and in which:

Figure 1 is a side elevation of a talking machine with my improved automatic brake attached thereto; Fig. 2 is a plan view with a portion of the swinging arm broken away to disclose the parts of the mechanism be-

neath; Fig. 3 is a plan view showing the brake-shoe in engagement with the periphery of the record-disk, the stylus having been disengaged from the record groove; Fig. 4 is a front view of a sound reproducing instrument showing method of attaching the automatic brake, and Fig. 5 is a perspective view of the clip for supporting the brake lever.

Referring to the drawings in detail, the numeral 10 indicates the casing of a talking machine, and 11 a record-disk which is held by the end of the motor driven shaft 12 concentric with the table 13 in the usual manner. The usual arm support 14, fixed to a plate 15 is secured in the ordinary way to the casing 10 by screws 16. The horn or swinging arm 17 is of the common form and carries a sound box from which projects a needle or stylus 18 adapted to engage the spiral sound groove of the record-disk 11.

A bracket 19 is furnished with a slot 20 adapted to receive one of the screws 16, by means of which the bracket is removably attached to the instrument, the said slot permitting a vertical adjustment. A clip 21 is secured to the horizontal arm of the bracket 19 by a screw 22 provided with a winged nut 23, said screw passing through a slot 23^a in the lower arm of said clip. The upper arm 24 supports a brake lever 25, which is pivotally connected to said arm by a pivot screw 26.

Near the middle of said brake lever 25 is attached a short horizontal arm 27 secured by a screw 28. Upon this arm rests a plate 29 having a slot 30 through which passes a screw 31 to secure said plate to the arm 27. The plate 29 carries a lever 32 the free extremity of which rests upon a detent arm 33 fixed to the lever 25, the margin of said lever 32 engaging notches 34 in the detent arm. A finger 35 depends from a ring or band 36 which encircles the horn 17, said finger serving as a guide to control the brake lever, the latter being held in yielding contact with said guide 35 by a coiled spring 37 which is attached at one end to a pin 38 depending from the under side of the lever 25, and at the other is secured to the free end of an adjustable finger 39, the fixed end 40 of said finger being bent in a sharp curve and secured to

the upright portion of the clip 21 by a screw 41. The tension of the spring 37 is regulated by a thumb screw 43 which has threaded connection with said finger the end of the screw engaging the margin of the clip 21. The screw 41 has sufficient play in the end of the curved portion of the finger to allow of the required adjustment.

The parts of the device having been assembled upon the bracket 19, to attach the brake to an instrument it is only necessary to remove one of the screws 16, and apply the bracket to the plate 15 in the manner shown in the drawings, and attach the ring 36 carrying the operating finger 35 to the swinging arm 17. The slot 20 will permit of sufficient vertical adjustment to suit all sizes of instruments and the slot 23^a in the clip 21 will accommodate the lever 25 to the various diameters of record disks. When the needle 18 engages the sound groove near the outer margin of the record disk as illustrated in Fig. 2, the finger 35 will engage the brake lever 25 at some point beyond the arm 27, and the finger-supporting ring 36 must be placed in such a position upon the arm 17 that the finger 35 will exert sufficient pressure against the brake lever to maintain a slight interval between the brake shoe and the peripheral face of the turn table 13.

With the ordinary type of talking machine the reproducing needle through its engagement with the sound groove carries the sound box over the face of the record causing more wear upon the outer bank of said sound groove than upon the inner bank. In the device under consideration, however, the lever 25, which is pressed against the finger 35 by the spring 37 causes the needle 18 to exert a force against the inner bank of the sound groove. The said spring can be so adjusted as to overcome the inward pressure thereby centralizing the needle in the record groove and producing equal wear upon both banks of the sound groove which has the effect of prolonging the life of the record.

While the needle is being propelled toward the center of the record, the finger 35 will move along the margin of the lever 25 and there will be a slight movement of the said lever upon its center, such movement being due to the angle at which the brake arm is set against the movement of the swinging arm. As soon as the needle has reached the terminus of the sound groove, however, it is released from the confining walls of the groove, and rides upon the plain portion of the record and is free to swing quickly inward from the pressure of the spring 37 against the finger 35 attached to the swinging arm. The finger will now rest against the arm 27 which forms a stop therefor and holds the needle 18 at the desired location upon the blank portion of the record. Under ordinary conditions a thumb brake is used

to start or stop the revolutions of the turn table, but the necessity for such brake is entirely obviated by the use of this improved form of braking device.

At certain times during the operation of the machine and especially when changing the needle, the sound box is carried outwardly away from the record so that the needle is entirely disengaged from the sound groove. Under these conditions the curved portion of the distal end of the lever 25 will recede from the path of the finger 35 sufficiently to permit the opposite end of said lever carrying the brake shoe to engage the periphery of the turn table with sufficient force to stop its movement. When the sound box is again moved into engagement with the record to be played, the finger 35 will impinge against that portion of the said lever which lies adjacent to the stop 27 thereby releasing the turn table and permitting the record to revolve.

It will be understood that the replacement of the needle in its initial position at the beginning of the record groove, or at any intermediate point upon the record will cause the brake lever to be restored to its first position through the engaging action of the finger 35, and the brake shoe will be removed from contact with the disk.

The function of the lever 32 is to change the path of the finger 35 when disks of different diameters are used, the end of said lever being changed from one notch to the other according to the size of the disk employed.

It is evident that many changes may be made in the devices of my invention as herein disclosed without departing from the spirit and scope thereof, and I do not wish, therefore, to be limited to the precise construction set forth.

Having thus described my invention what I claim is:—

1. A talking-machine having a motor-box, a turntable, a sound-conveying tube pivotally mounted on the motor-box, a lever pivotally mounted on the motor-box, resilient means for moving said lever in one direction during and in accordance with the movement of said tube, and a brake for the turntable operated by said lever.

2. A talking-machine having a casing, a sound-conveying tube pivotally mounted thereon, a member secured to said casing, means for adjusting the position of said member, a brake lever pivoted to said member, a spring for moving said lever in one direction and a finger removably secured to said sound-conveying tube and engaging said lever, substantially as set forth.

3. A talking-machine having a casing, a sound-conveying tube pivotally mounted thereon, a turn-table, a bracket secured to the said casing, means for adjusting the

position of said bracket, a brake lever supported on said bracket and adapted to frictionally engage said turn-table, a finger removably attached to the sound-conveying tube and engaging said brake lever and a stop for said finger carried by said brake lever, substantially as set forth.

4. A talking machine having a casing, a sound-conveying tube pivotally mounted thereon, a turn-table, a bracket removably secured to said casing, means for adjusting said bracket, a brake lever pivoted to said bracket, means for adjusting said brake lever relative to the bracket, an adjustable spring connected to said lever, a finger detachably connected to said sound-conveying tube and coacting with said lever, a stop for said finger carried by the brake lever, and means for adjusting the position of said stop, substantially as described.

5. A talking-machine having a motor-box, a turntable, a sound-conveying tube pivotally mounted on the motor-box, a lever coacting with said tube, means for permitting an adjustment of the position of said lever, a spring for moving said lever in one direction during and in accordance with the movement of said tube, and a brake for the turntable operated by said lever.

6. A talking-machine having a motor-box, a turntable, a sound-conveying tube pivotally mounted on the motor-box, a lever coacting with said tube, a stop on said lever, a spring for moving said lever in one direction during and in accordance with the movement of said tube, and a brake for the turntable operated by said lever.

7. A talking-machine having a motor-box, a turntable, a sound-conveying tube pivotally mounted on said box, a bracket adjustably mounted on the box, a lever pivoted on said bracket and adjustable thereon, said lever coacting with said tube, a spring for moving said lever in one direction during and in accordance with the movement of said tube, and a brake for the turntable operated by said lever.

8. In a sound reproducing machine the combination with a record carrying body, a continuous spiral groove on said body adapted to contain the record, a stylus adapted to pass over said record and to be guided by said groove in a predetermined direction; of yielding means adapted to move said stylus over said record in said direction in co-operation with the groove, and to continue

to move said stylus after it has left said groove.

9. In a sound reproducing machine the combination with a record carrying body, a continuous spiral groove on said body adapted to contain the record, a stylus adapted to pass over said record and to be guided by said groove in a predetermined direction and an arm supporting said stylus at one end and suitably pivoted at the other end; of yielding means operatively connected with said arm adapted to move said box over said record in said direction in coöperation with said groove, and to continue to move said stylus after it has left said groove.

10. In a sound reproducing machine the combination with a record table, a record carrying body on said table, a continuous spiral groove on said body adapted to contain the record, a stylus adapted to pass over said record and to be guided by said groove in a predetermined direction, means for supporting said stylus adapted to move with said stylus, and a stop member for said table adapted to be operated by the movement of said supporting means, after the stylus has passed said record; of yielding means adapted to move said stylus over said record in said direction in coöperation with said groove and to continue to move said stylus after it has left said groove to operate stop member.

11. In a sound reproducing machine the combination with a record table, a record carrying body on said table, a continuous spiral groove on said body adapted to contain the record, a sound box adapted to pass over said record and to be guided by said groove in a predetermined direction, an arm supporting said sound box at one end and suitably pivoted at the other end, and a stop member for said table adapted to be operated by the movement of said arm, after said box has passed over said record, of a spring operatively connected with said arm adapted to move said box over said record in said direction in coöperation with said groove and to continue moving said box after leaving said groove to operate said member.

In testimony whereof I affix my signature in the presence of two witnesses.

FREDERICK SHEPPY.

Witnesses:

C. B. BENJAMIN,
M. A. MILORD.

J. PEARSON.
SOUND MODIFIER FOR PHONOGRAPHS, &c.
APPLICATION FILED JAN. 14, 1908.

929,482.

Patented July 27, 1909.

Fig. 1.

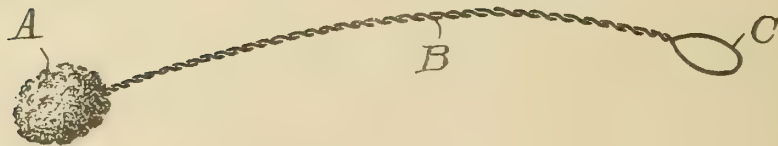
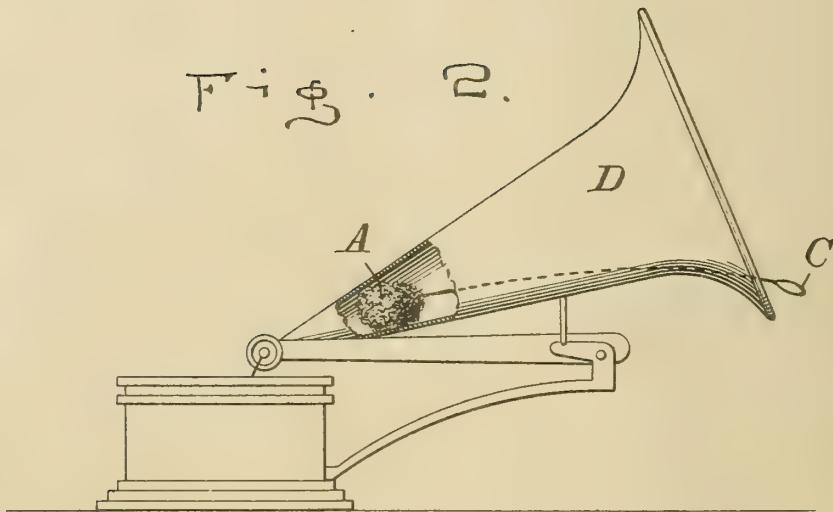


Fig. 2.



WITNESSES:

Thos. W. Riley
L. J. Jacoby.

INVENTOR
J. Pearson

BY
W. J. Fitzgerald & Co
Attorneys

UNITED STATES PATENT OFFICE.

JAMES PEARSON, OF DENTON, NEBRASKA.

SOUND-MODIFIER FOR PHONOGRAPHS, &c.

No. 929,482.

Specification of Letters Patent.

Patented July 27, 1909.

Application filed January 14, 1908. Serial No. 410,762.

To all whom it may concern:

Be it known that I, JAMES PEARSON, a citizen of the United States, residing at Denton, in the county of Lancaster and State of Nebraska, have invented certain new and useful Improvements in Sound-Modifiers for Phonographs, Graphophones, and Like Instruments, of which the following is a specification.

My invention relates to certain new and useful improvements in sound modifiers or mufflers, more especially for use with phonographs, graphophones, and the like.

It has for its object more particularly to simplify construction, to facilitate the application of the instrument for use, and provide for the ready and effective retention thereof in position when so applied.

It consists of the detailed construction and arrangement of certain parts substantially as hereinafter fully disclosed and defined by the claim.

In the accompanying drawing embodying my invention, Figure 1 is a perspective view thereof. Fig. 2 is a view in elevation of an instrument of the sound producing type termed the graphophone, including its horn or megaphone, having the invention applied thereto.

In carrying out my invention I form the same of a member A, which constitutes the muffler proper and which is of some readily compressible and fibrous material, as cotton, wool, felt or the like, having the approximate general outline as disclosed by the drawing, being ball-like, for facility and ready application within the horn or megaphone D, as suggested in Fig. 2 of said drawing. It is apparent that by suitably forcing the member or muffler A into the horn to a greater or less extent, the sound emitted therefrom will be accordingly modified or muffled as may be desired.

In order that the member or muffler A may be readily or conveniently applied for use as indicated, I provide a stem or handle B therefor, forming said stem or handle of a continuous piece of wire bent about centrally upon itself and looped around and tightly embracing said muffler member, the thus formed strands of said continuous piece be-

ing twisted back one upon the other and adapted to form a loop-terminal C at its outer end for facility of engagement therewith by the finger.

The stem formed of the wire or wires so bent will lie upon the bottom of the horn or megaphone, with the end loop C of said stem extending a few inches beyond the megaphone or horn and thus remain more firmly at the place where it is desirable to use it, for results according to the record being used and the general surroundings. From this structural characteristic of my invention, it will be noted that no additional contrivance is necessary to hold the device in position, but, because the outer looped end C of the stem having a tendency to pull outwardly and the inner end A, a tendency to pull inwardly or oppositely, there is an equilibrium manifest, and the device or regulator will not only stay just where it is placed, but it will equalize its own weight to such an extent that the reproducer of the machine is not required to carry any harmful weight.

I claim—

A device of the character described for a megaphone, comprising a sound-muffler member and a stem-member carrying the sound-muffler member at one end and having a looped finger engaged terminal at its opposite end, said stem-member being adapted to lie upon the bottom of the megaphone and to incline inwardly and downwardly toward its inner end and to incline outwardly and downwardly toward its outer end at about a median line passing vertically through said stem-member, said stem-member being formed of a continuous piece bent about centrally upon itself and looped around and tightly embracing said sound-muffler member and the thus formed strands of said continuous piece being twisted back one upon the other and forming the looped finger engaged member at its outer end.

Signed by me this eleventh day of January 1908.

JAMES PEARSON.

Witnesses:

CYRIL CLEGG,

C. M. ROWLAND.



F. SHAFPER.
TALKING MACHINE.
APPLICATION FILED MAR. 9, 1909.

929,505.

Patented July 27, 1909.
5 SHEETS—SHEET 1.

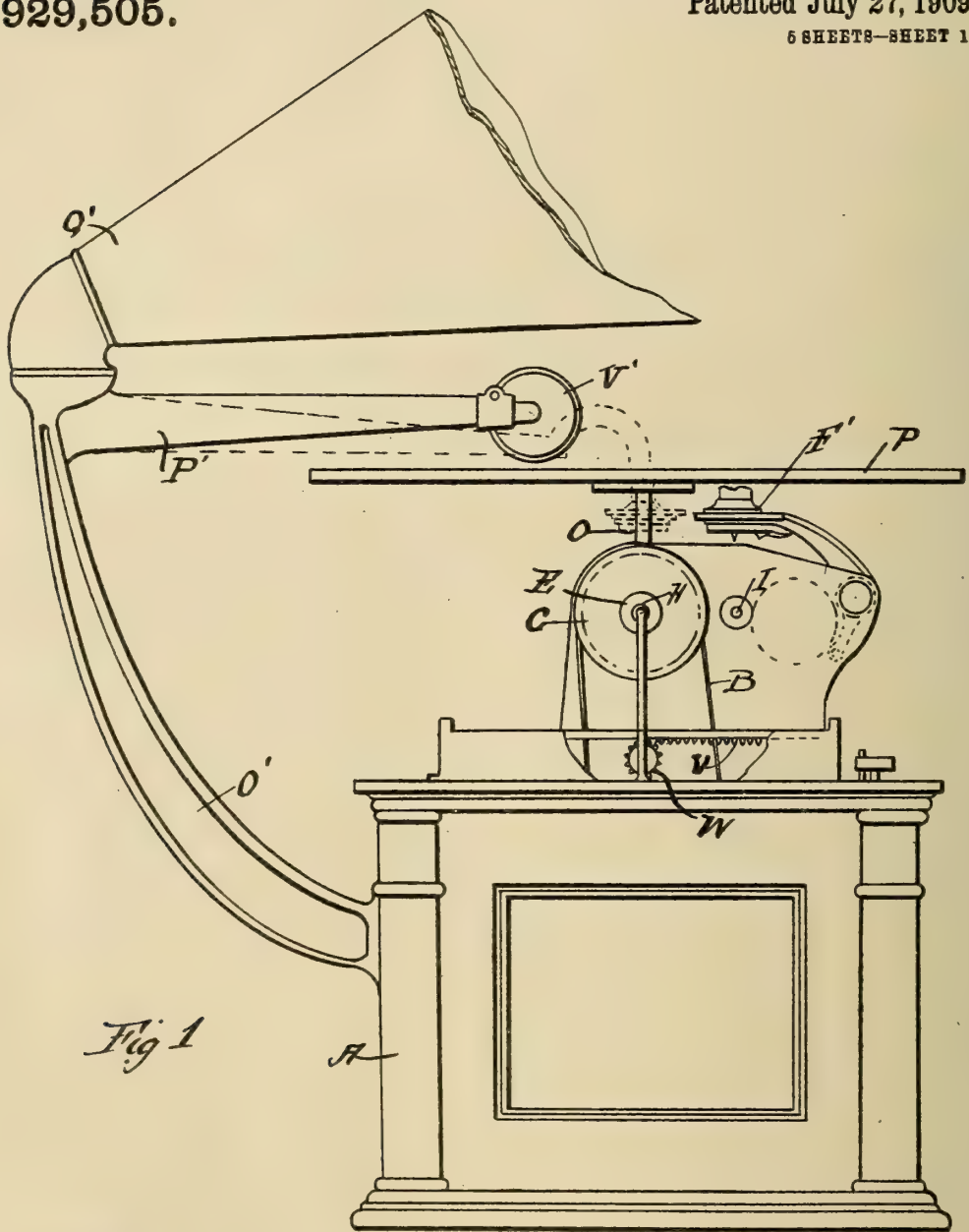


Fig 1

WITNESSES

S. M. Gallagher.
Francis A. Brock

INVENTOR

Fred Shaffer

BY

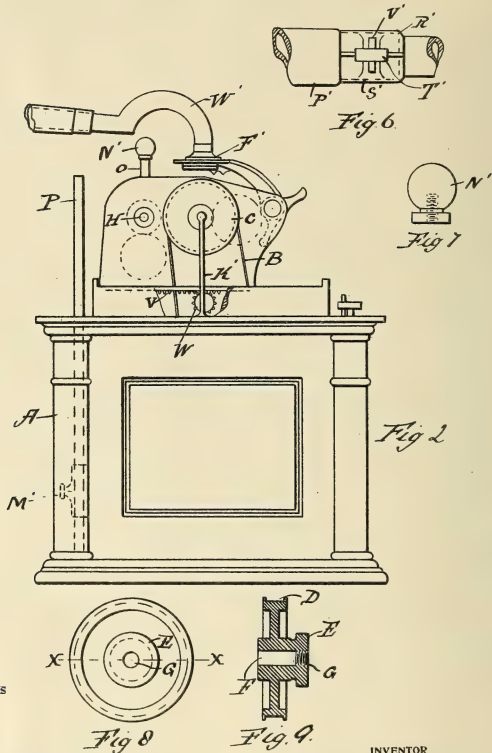
W. P. Sullivan

ATTORNEY

F. SHAFER.
TALKING MACHINE.
APPLICATION FILED MAR. 9, 1909.

929,505.

Patented July 27, 1909.
5 SHEETS—SHEET 2.

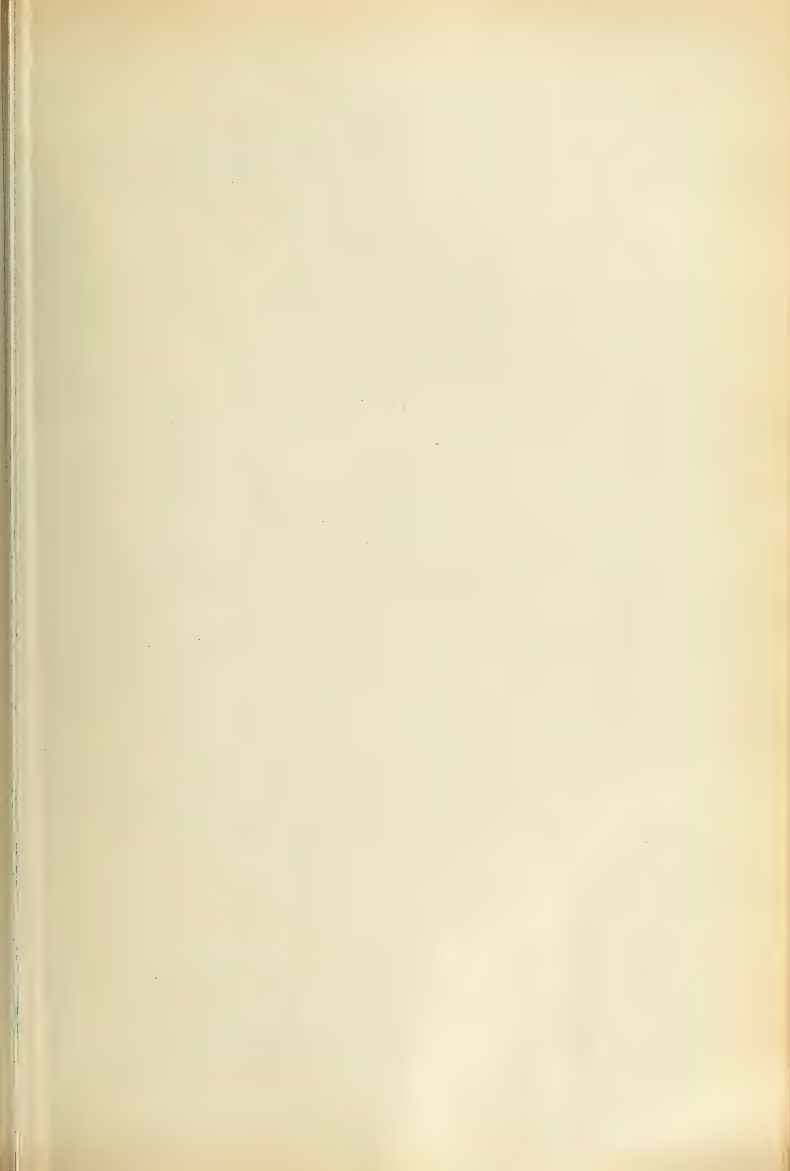


WITNESSES

Francis A. Pack.
S. M. Gallagher.

INVENTOR
Fred Shaffer
BY

W. P. Williams
ATTORNEY

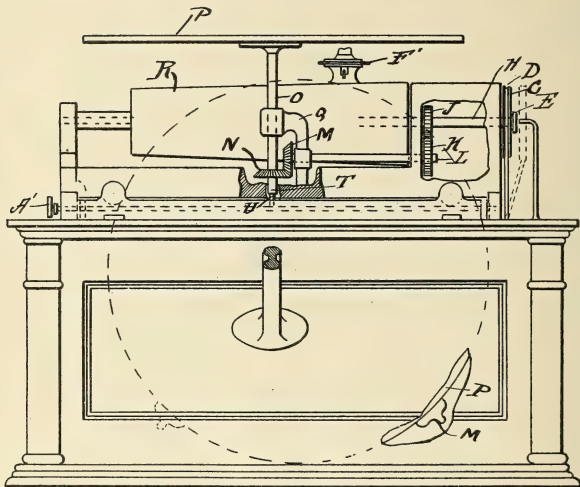


F. SHAFFER.
TALKING MACHINE.
APPLICATION FILED MAR. 9, 1909.

929,505.

Patented July 27, 1909.
6 SHEETS—SHEET 3.

Fig 3



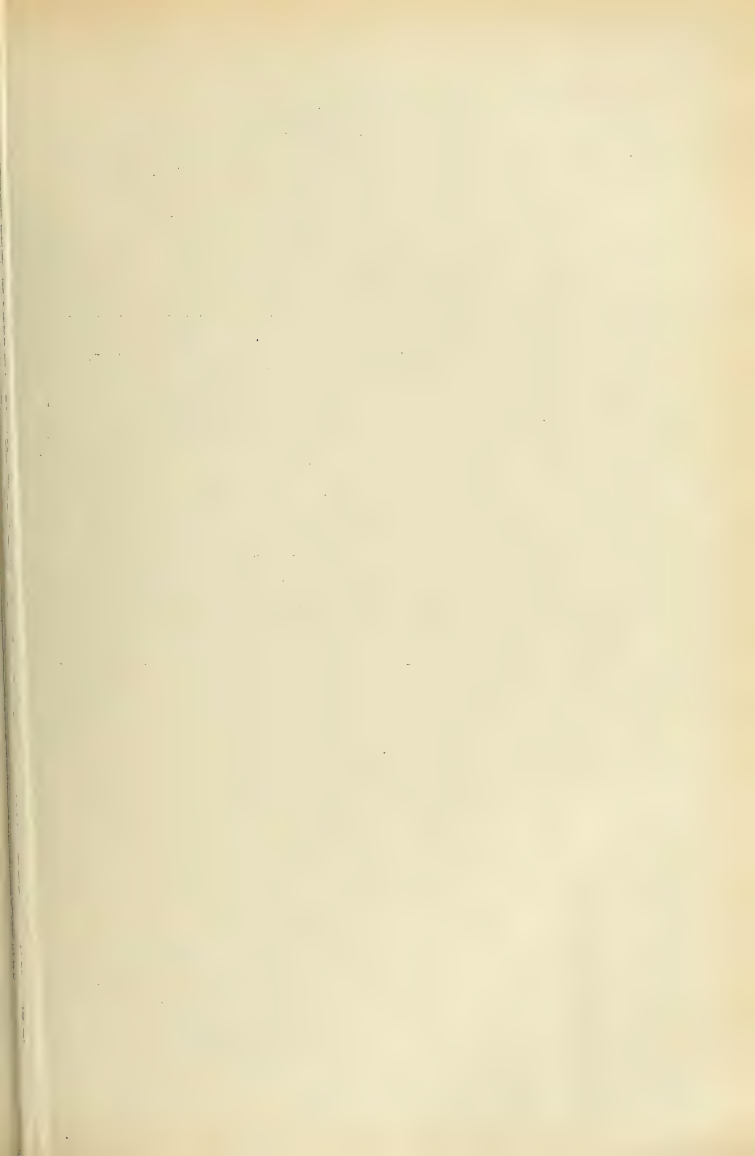
WITNESSES

S. M. Gallagher.
Francis A. Pocock.

INVENTOR

Fred Shaffer
BY

W. P. Williams ATTORNEY

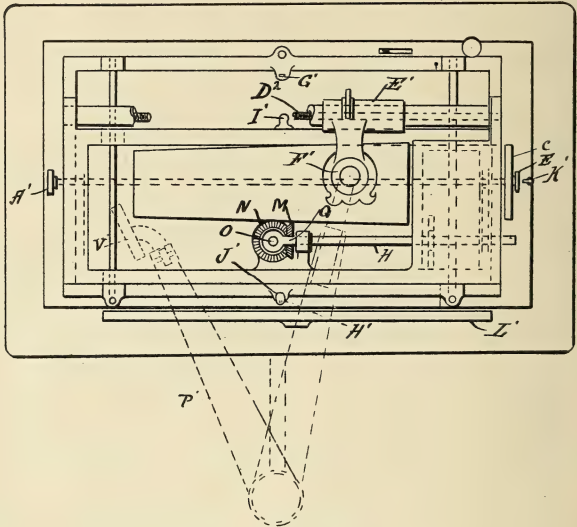


F. SHAFFER.
TALKING MACHINE.
APPLICATION FILED MAR. 9, 1909.

929,505.

Patented July 27, 1909.
58 SHEETS—SHEET 4.

Fig. 4.



WITNESSES

S. M. Gallagher
Francis A. Pock

INVENTOR
Fred Shaffer
BY

W. P. Thompson
ATTORNEY



F. SHAFPER.
TALKING MACHINE.
APPLICATION FILED MAR. 9, 1909.

929,505.

Patented July 27, 1909.
5 SHEETS—SHEET 5.

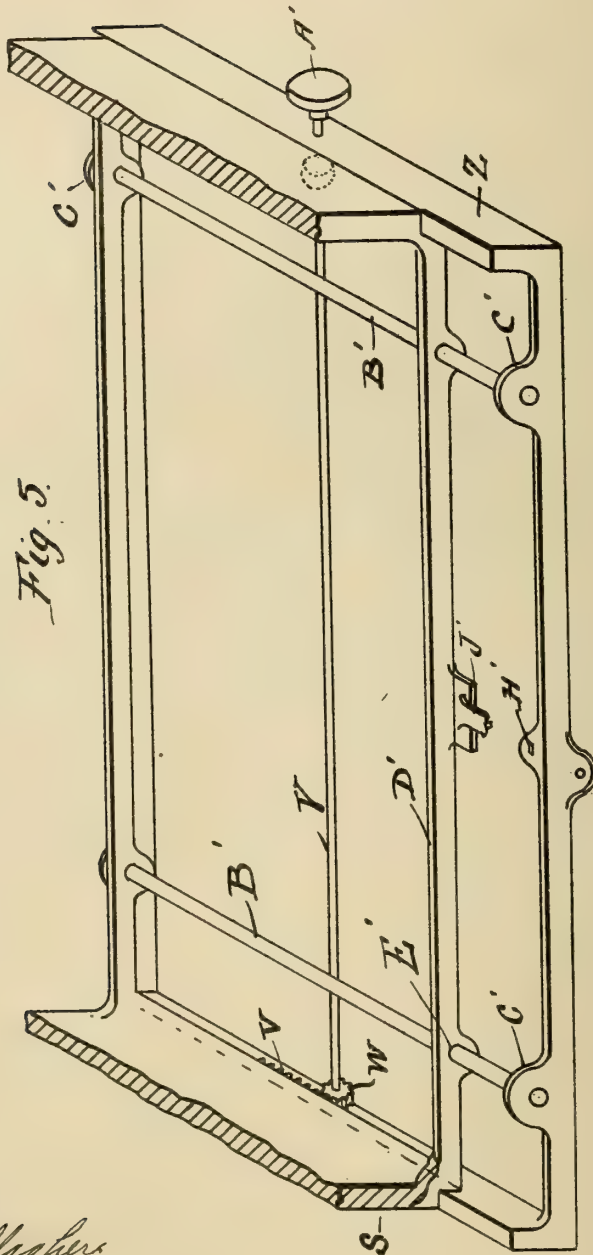


Fig. 5.

WITNESSES

S. M. Gallagher
Francis A. Pock

INVENTOR

Fred Shaffer

BY

W. P. Williamson ATTORNEY

UNITED STATES PATENT OFFICE.

FRED SHAFFER, OF VANDERGRIFT, PENNSYLVANIA.

TALKING-MACHINE.

No. 929,505.

Specification of Letters Patent.

Patented July 27, 1909.

Application filed March 9, 1909. Serial No. 482,344.

To all whom it may concern:

Be it known that I, FRED SHAFFER, a citizen of the United States, residing at Vandergrift, in the county of Westmoreland and State of Pennsylvania, have invented a certain new and useful Improvement in Talking-Machines, of which the following is a specification.

My invention relates to a new and useful improvement in talking machines, and has for its object to provide an exceedingly simple and effective device of this character whereby either disk or cylinder records may be used upon the same machine.

With these ends in view, this invention consists in the details of construction and combination of elements hereinafter set forth and then specifically designated by the claims.

In order that those skilled in the art to which this invention appertains may understand how to make and use the same, I will describe its construction in detail, referring by letter to the accompanying drawing forming a part of this specification, in which—

Figure 1 is an end view, parts thereof being broken away showing the machine in position for playing disk records. Fig. 2, a similar view showing the machine in position for playing cylinder records. Fig. 3, a rear view of Fig. 1, parts of the machine being broken away to more clearly show the operating parts. Fig. 4, a plan view showing the arm carrying the reproducer in dotted lines. Fig. 5, an enlarged perspective view of the frames showing the shifting mechanism. Fig. 6, a view in elevation of the clamp for adjusting the disk reproducer to the tapering arm of the horn. Fig. 7, a view in elevation of a knob or shield to be placed on the end of the disk or cylinder shaft. Fig. 8, a face view of the drive pulley, and Fig. 9, a section at the line X—X of Fig. 8.

In carrying out my invention as here embodied, A represents the box or cabinet in which is placed a suitable motor from which leads the drive belt B passing around the drive pulley C, said pulley being constructed with a groove D around its periphery and having formed integral therewith a thumb nut E. Through said pulley passes an opening F in the walls of which are formed the left hand threads G, said threads adapted to engage with threads formed on the end of the shafts H and I. When the drive pulley C is on the

shaft H and revolving said shaft it will revolve the gear J secured thereto, and as said gear meshes with the gear K this gear will be revolved, and as this last named gear is secured to the shaft L this shaft will be revolved, and on the opposite end thereof is secured a bevel gear M which meshes with the bevel gear N secured to the disk table shaft O, to the upper end of which is removably secured the disk table P. The shaft L and the disk table shaft O are journaled in suitable bearings formed in the bracket Q which is integral with the upper frame S to be hereinafter described. The lower end of the shaft O is journaled in the lower portion of the upper frame as indicated by T, and entering said frame from beneath so that it rests against the lower end of the shaft O is a set screw U whereby the shaft O may be adjusted to overcome the wearing away of the same by constant use. When the drive pulley C is on the shaft I as shown in Fig. 2 it is then a direct drive, for on the shaft I is secured the conical cylinder holder R on which are placed the cylinder records when being played.

S is the upper frame with the lower surface of each end of which is formed the rack V or said rack may be formed separately and attached to said frame if found desirable. Engaging with these racks are the pinions W which are securely fastened to the shaft Y, the ends of which are journaled in the lower frame Z, one of said ends extending through the frame and having thereon a thumb nut X whereby said shaft may be revolved for moving the upper frame S to and fro.

B' denotes guides which are immovably secured to the lugs C' formed with the lower frame Z, and on these guides slides the upper frame S, the sides D' of which are provided with openings E' through which pass said guides B'. The ends of the upper frame S extend upward so as to form suitable journaling places for the different shafts of the mechanism.

Journaled in the ends of the upper frame S is a worm D' which is revolved in suitable ratio to the shaft I whereby the traveler E' carrying the cylinder reproducer F' will be moved along at a suitable speed.

In order that the movable parts will be held stationary in any one position I provide the lower frame with the oppositely disposed apertures G' and H', and on the sides of the upper frame are secured the op-

positely disposed spring catches I' and J' so that when the upper frame is moved to the rear the spring catch J' will automatically engage with the aperture H' thereby holding the movable parts in the position to the rear of the machine. Now when it is desired to shift the upper frame forward the catch J' is disengaged from the aperture H', said frame is then moved forward until the catch I' automatically engages with the aperture G' at which time the parts will be held in the forward position.

Secured to the top of the box A is a support K' which will be in the center of the shaft H when the frame is moved forward, and in the center of the shaft I when the frame is moved to the rear. This support is adapted to receive and hold the pulley C while the shifting is taking place.

In the rear of the box or cabinet A is formed the opening L' in which are placed the supports M' against which will rest the disk table P when it has been removed from the shaft O and placed in the opening L'. and when the disk table has been removed the knob N' may be placed on the end of the shaft O which will preserve the threads thereon and assist in beautifying the machine.

To the rear of the box or cabinet A is fastened the bracket O' to the upper end of which is pivoted the tapering arm P', the rear end of which carries the horn Q'. The forward end of the tapering arm P' is reduced in size as indicated by R' and over this reduced portion fits the clamp S' which is drawn together by a circular nut T' having the screws U' formed integral therewith, one of which is provided with a left hand and the other a right hand thread. This clamp is used to secure the disk reproducer V' to the tapering arm P'. When the machine is to be used for playing the cylinder records the clamp S' and the disk reproducer V' are removed and the connector W' is placed in the forward end of the tapering arm P' and over the outlet of the cylinder reproducer F'.

The operation of the machine is as follows: Assuming that the machine is playing the disk record as shown in Fig. 1 and it is desired to change it so that it will play cylinder records as shown in Fig. 2 I first unthread the pulley C from the shaft H allowing it to rest upon the support K', then by turning the thumb nut A' which will cause the pinions W to revolve through the medium of the shaft Y which will slide the upper frame S to the rear, carrying the center of the shaft I to where the center of the shaft was before the change took place or in alignment with the upper end of the support K', it being understood that the catch I' has first been disengaged from the aperture G', and when the rearward movement is com-

plete the catch J' will automatically engage the aperture H'. Next I unclamp the disk reproducer V' and remove the disk table P placing it in the opening L' at the rear of the cabinet, then I insert the connector W' in the tapering arm and place it over the cylinder reproducer F'. Now the pulley C may be threaded on to the shaft I at which time the change will be complete and the machine ready for playing cylinder records. This change will take but very little time yet it increases the value of the device as either style record commonly in use may be used.

Of course I do not wish to be limited to the exact details of construction here shown as these may be varied within the limits of the appended claims without departing from the spirit of my invention.

Having thus fully described my invention, what I claim as new and useful, is—

1. In a talking machine, a cabinet provided with an opening in the rear, supporting members placed in said opening, a lower frame provided with apertures and having lugs formed therewith, guide rods secured to said lugs, an upper frame provided with racks having upwardly extending ends, said frame adapted to carry the disk and cylinder operating mechanism, the sides of said upper frame having openings therein through which pass the guide rods, a shaft, the ends of which are journaled to the lower frame, pinions secured thereto engaging with the rack on the upper frame, and a thumb nut secured to one end of the shaft for revolving the same, as specified.

2. In a talking machine, a cabinet provided with an opening in the rear, supporting members placed in said opening, a lower frame provided with apertures and having lugs formed therewith, guide rods secured to said lugs, an upper frame having upwardly extending ends and side pieces connecting said ends, said side pieces having openings formed therein through which pass the guide rods, spring catches secured to said sides adapted to engage with the apertures in the lower frame, racks mounted on the under surface of the upper frame, a shaft journaled in the lower frame, pinions securely mounted thereon meshing with the racks, a thumb nut fastened to the end of said shaft, a disk playing apparatus, a cylinder playing apparatus, both of which are carried by the sides of the upper frame, and means for operating the same, as and for the purpose set forth.

3. In a talking machine, a cabinet provided with an opening in the rear, supporting members placed in said opening, a lower frame provided with apertures and having lugs formed therewith, guide rods secured to said lugs, an upper frame having upwardly extending ends and side pieces connecting

said ends, said side pieces having openings formed therein through which pass the guide rods, spring catches secured to said sides adapted to engage with the apertures on the lower frame, racks mounted on the under side of the upper frame, a shaft journaled in the lower frame, pinions securely mounted thereon meshing with the racks, a thumb nut fastened to the end of said shaft, a bracket formed integral with the upper frame having a vertical and horizontal bearing, a disk playing shaft mounted in the vertical opening and having its lower end journaled in the lower portion of the upper frame, means for adjusting said shaft to take up the wear, a bevel gear mounted on said shaft, a horizontal shaft mounted in the horizontal bearing, a bevel gear mounted on one end thereof engaging with the bevel gear on the disk table shaft, a gear mounted on the opposite end of said shaft, another horizontal shaft journaled in the sides of the upper frame, said shaft having threads formed on its upper end, a gear mounted on said shaft adapted to mesh with the gear mounted on the first named horizontal shaft, another horizontal shaft having threads formed on its outer end journaled in the sides of the upper frame, a conical cylinder holder secured to said shaft, and means for revolving either of the last two named horizontal shafts.

4. In a talking machine, a cabinet provided with an opening in the rear, supporting members placed in said opening, a lower frame provided with apertures and having lugs formed therewith, guide rods secured to said lugs, an upper frame having upwardly extending ends and side pieces connecting said ends, said side pieces having openings formed therein through which pass the guide rods, spring catches secured to said sides adapted to engage with the apertures on the lower frame, racks mounted on the under side of the upper frame, a shaft journaled in the lower frame, pinions securely mounted thereon meshing with the racks, a thumb nut fastened to the end of said shaft, a bracket formed integral with the upper frame having a vertical and horizontal bearing, a disk playing shaft mounted in the vertical bearing and having its lower end journaled in the lower portion of the upper frame, a driving pulley having a thumb nut formed integral therewith adapted to be threaded on one of the last named horizontal shafts, and means for transmitting power from a power shaft to said pulley.

5. In a talking machine, a cabinet provided with an opening in the rear, supporting members placed in said opening, a lower frame provided with apertures and having lugs formed therewith, guide rods secured to said lugs, an upper frame having upwardly extending ends and side pieces connect-

ing said ends, said side pieces having openings formed therein through which pass the guide rods, spring catches secured to said sides adapted to engage with the apertures on the lower frame, racks mounted on the under side of the upper frame, a shaft journaled in the lower frame, pinions securely mounted thereon meshing with the racks, a thumb nut fastened to the end of said shaft, a bracket formed integral with the upper frame having a vertical and horizontal bearing, a disk playing shaft mounted in the vertical opening and having its lower end journaled in the lower portion of the upper frame, a driving pulley having a thumb nut formed integral therewith adapted to be threaded on one of the last named horizontal shafts, means for transmitting power from a power shaft to said pulley, a support secured to the cabinet on which may be placed the drive pulley while the machine is being shifted, a disk table secured to the upper end of the table carrying shaft, a disk reproducer, a cylinder reproducer, a horn having a tapering arm, and means for connecting said arm with either of the reproducers, as specified.

6. In a talking machine, a cabinet provided with an opening in the rear, supporting members placed in said opening, a lower frame provided with apertures and having lugs formed therewith, guide rods secured to said lugs, an upper frame having upwardly extending ends and side pieces connecting said ends, said side pieces having openings formed therein through which pass the guide rods, spring catches secured to said sides adapted to engage with the apertures on the lower frame, racks mounted on the under side of the upper frame, a shaft journaled in the lower frame, pinions securely mounted thereon meshing with the racks, a thumb nut fastened to the end of said shaft, a bracket formed integral with the upper frame having a vertical and horizontal bearing, a disk playing shaft mounted in the vertical bearing and having its lower end journaled in the lower portion of the upper frame, a driving pulley having a thumb nut formed integral therewith adapted to be threaded on one of the last named horizontal shafts, means for transmitting power from a power shaft to said pulley, a support secured to the cabinet on which may be placed the drive pulley while the machine is being shifted, a disk table secured to the upper end of the table carrying shaft, a horn, a disk reproducer, a clamp for securing said reproducer to the arm of the horn, a connector adapted to slide within the arm of the horn, a cylinder reproducer over which slides said connector, and a knob adapted to be threaded on the end of a shaft, as specified.

7. In a device of the character described, a cabinet, a lower frame secured thereto, an

upper frame carrying a disk and cylinder mechanism slidably secured to the lower frame, and means for sliding said upper frame, as shown and described.

- 5 8. In a device of the character described, a cabinet, a lower frame mounted on said cabinet, an upper frame slidably mounted on said lower frame, means for sliding said upper frame, horizontal shafts carried by
10 the upper frame, a disk table connected to one of said shafts, a cylinder holder connected to the other shaft, a drive pulley

adapted to be placed on either of the shafts whereby said shafts will be revolved, thus revolving either the disk table or cylinder holder, as specified.

In testimony whereof, I have hereunto affixed my signature in the presence of two subscribing witnesses.

FRED SHAFFER.

Witnesses:

A. E. YOUNG,

F. H. McLAUGHLIN.

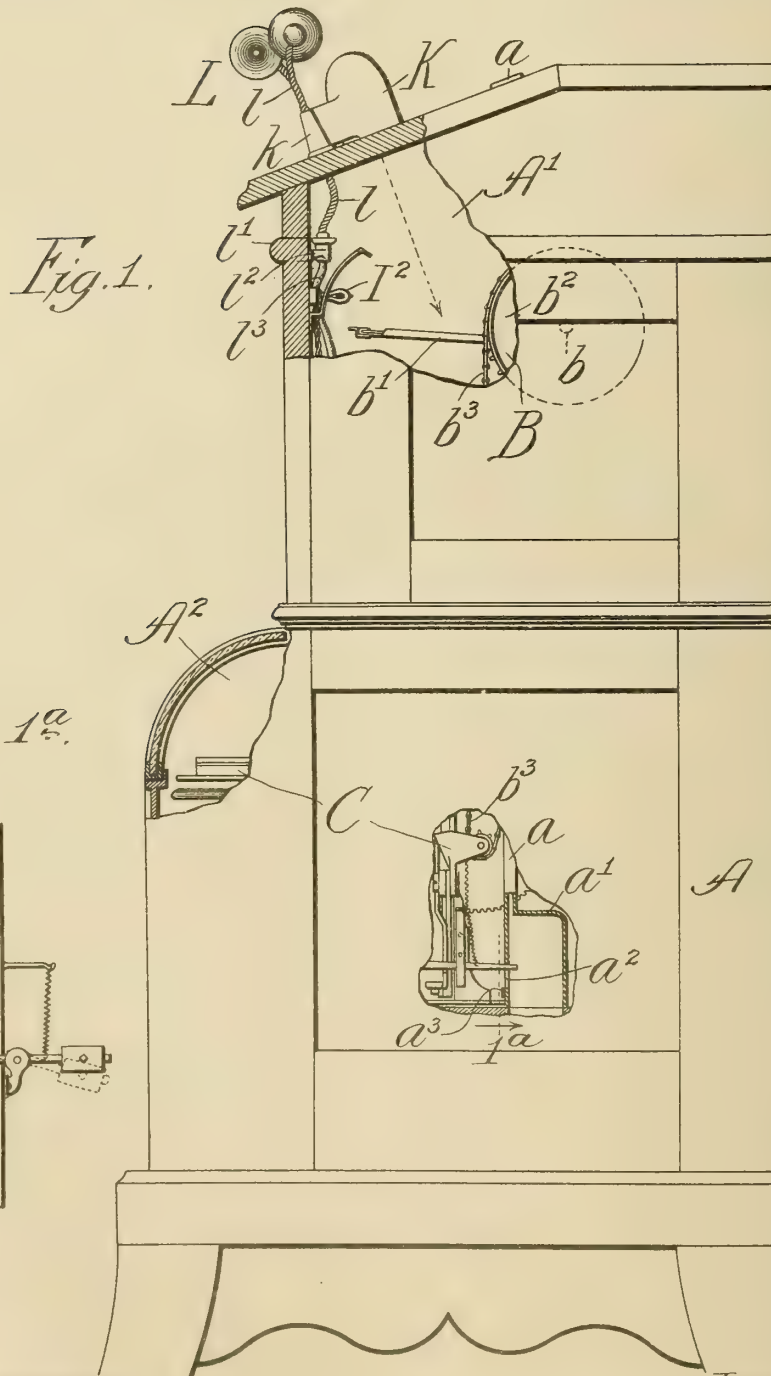
929, 175

H. S. MILLS.
 PHONOGRAPH MACHINE.
 APPLICATION FILED FEB. 27, 1905.

929,775.

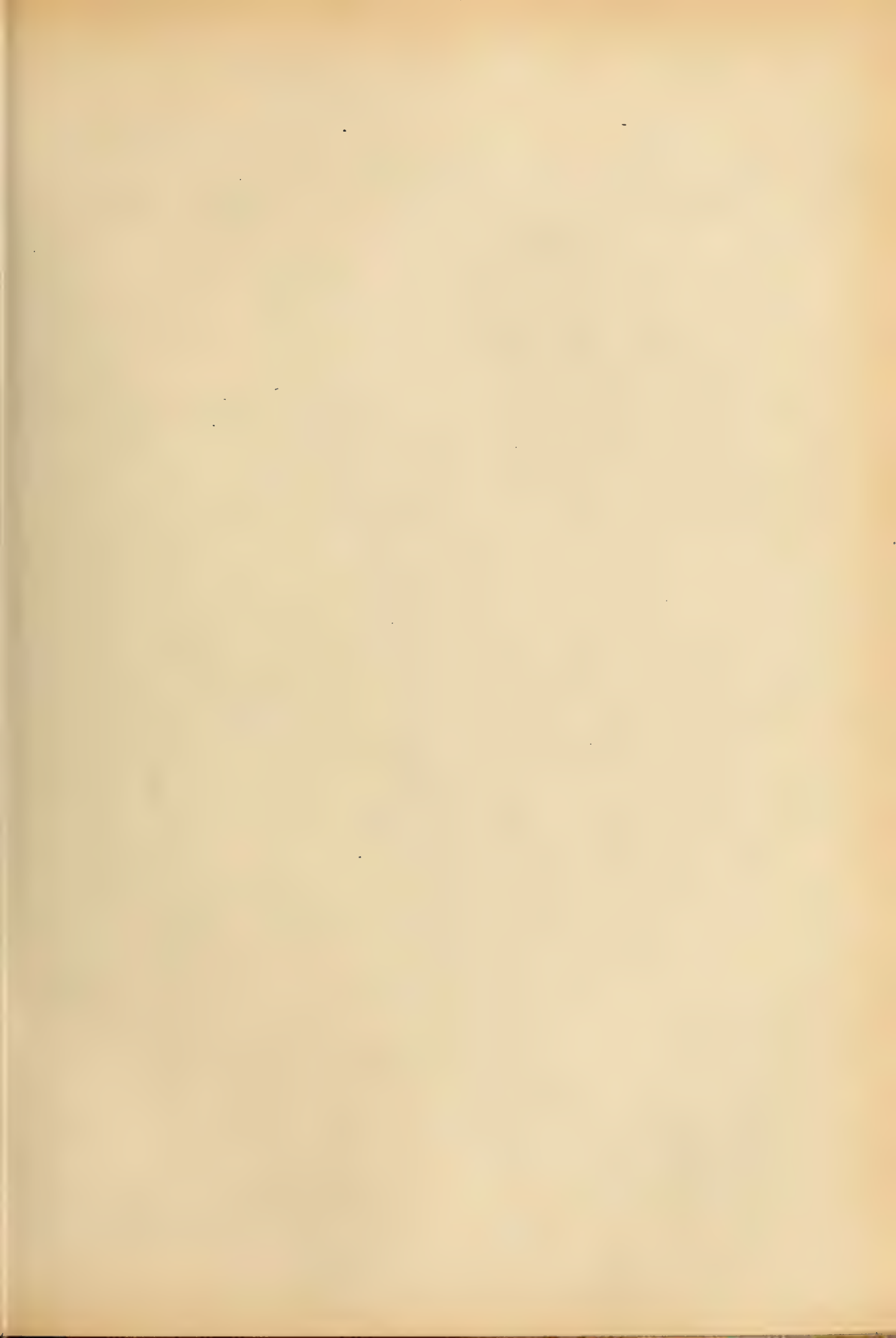
Patented Aug. 3, 1909.

10 SHEETS—SHEET 1.



Witnesses:
Edw. C. Daylord,
John Enders,

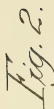
Inventor:
Herbert S. Mills,
 By *Dyrenforth, Dyrenforth & Lee,*
Attys.



APPLICATION FILED FEB. 27, 1905.

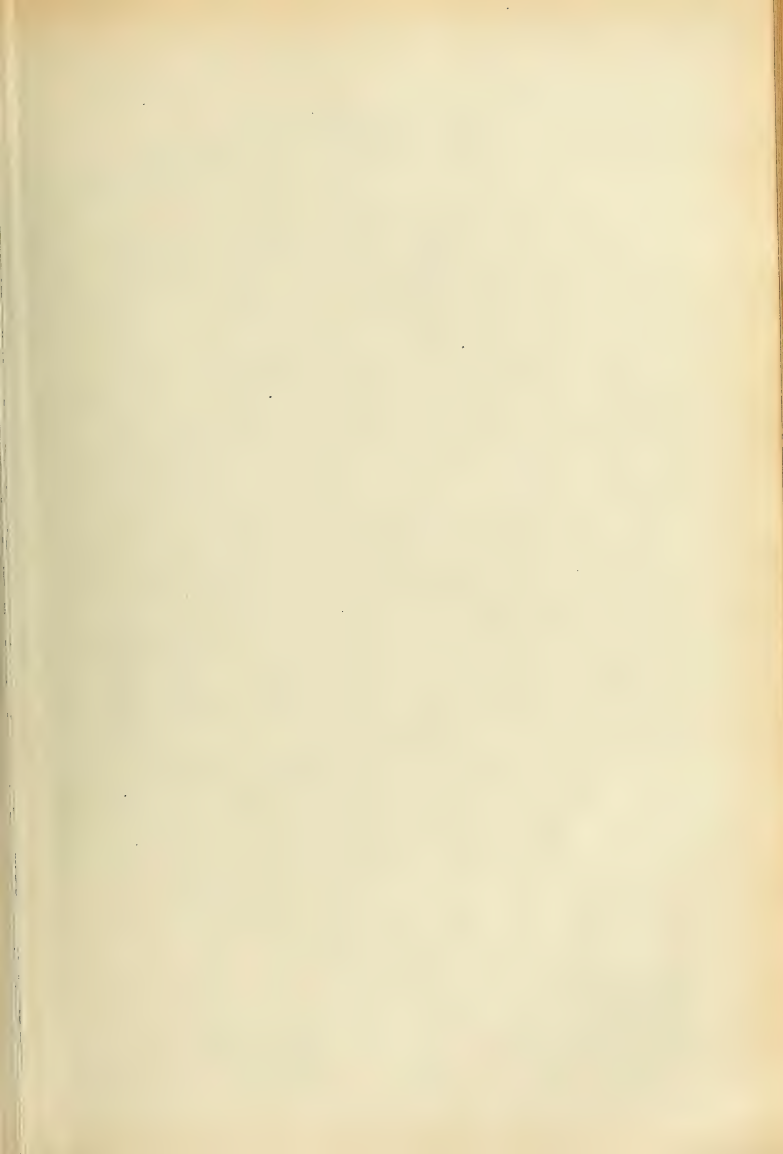
Patented Aug. 3, 1909.

10 SHEETS--SHEET 2.



Witnesses:
E. J. Payford.
John Enders.

Inventor
Herbert S. Mills,
By Dymenforth Dymenforth & Lee,
Attorneys



929,775.

10 SHEETS—SHEET 3.

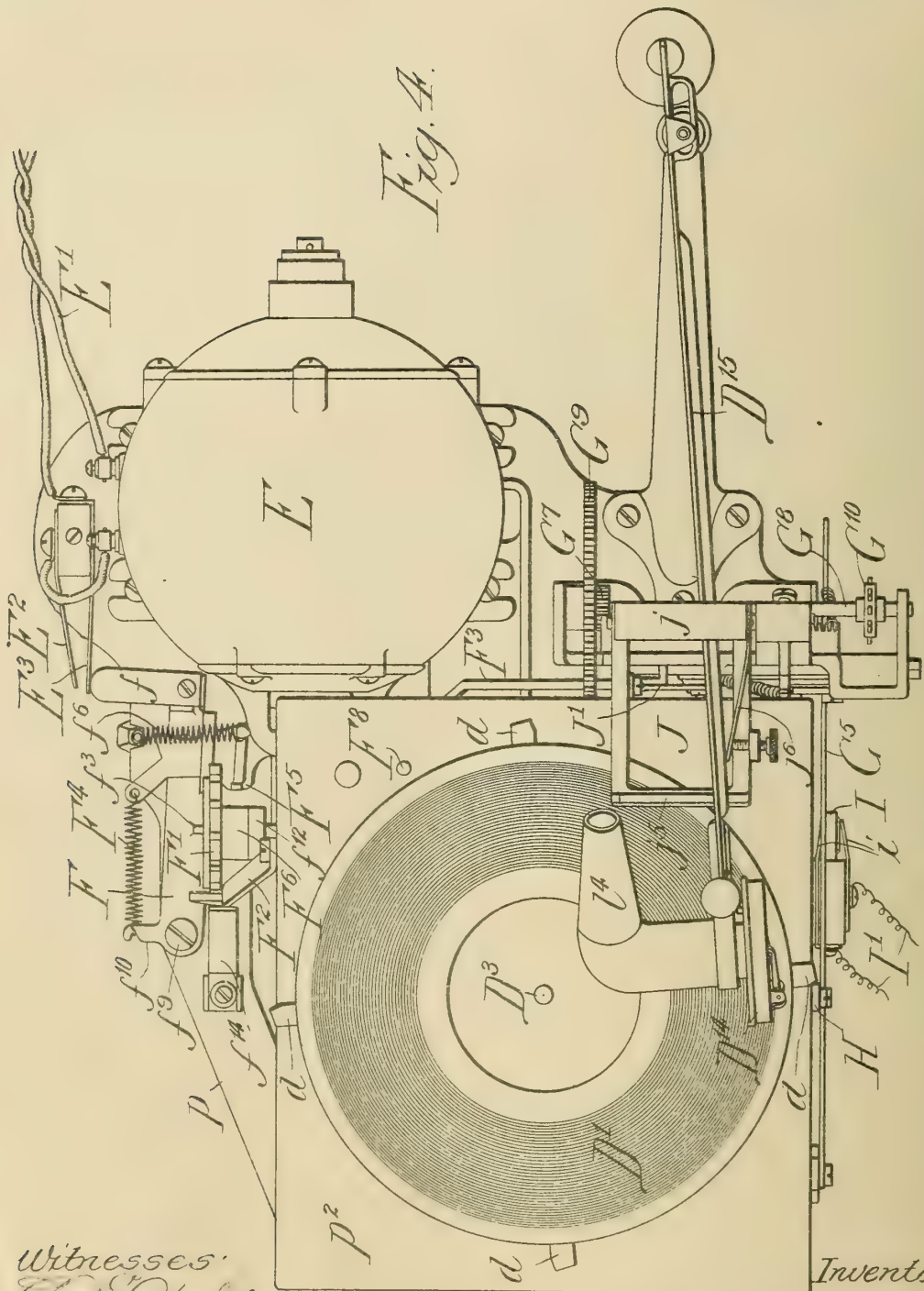


John Enders.

Herbert S. Mills,
By Deymouth, Deymouth & Lee,
Att'ys.

929,775.

Patented Aug. 3, 1909.
 10 SHEETS—SHEET 4.



Witnesses:
 C. E. Gaylord,
 John Enders.

Inventor
 Herbert S. Mills,
 By Dymforth, Dymforth & Lee,
 Att'ys.



H. S. MILLS.
 PHONOGRAPH MACHINE.
 APPLICATION FILED FEB. 27, 1905.

929,775.

Patented Aug. 3, 1909.

10 SHEETS—SHEET 5.

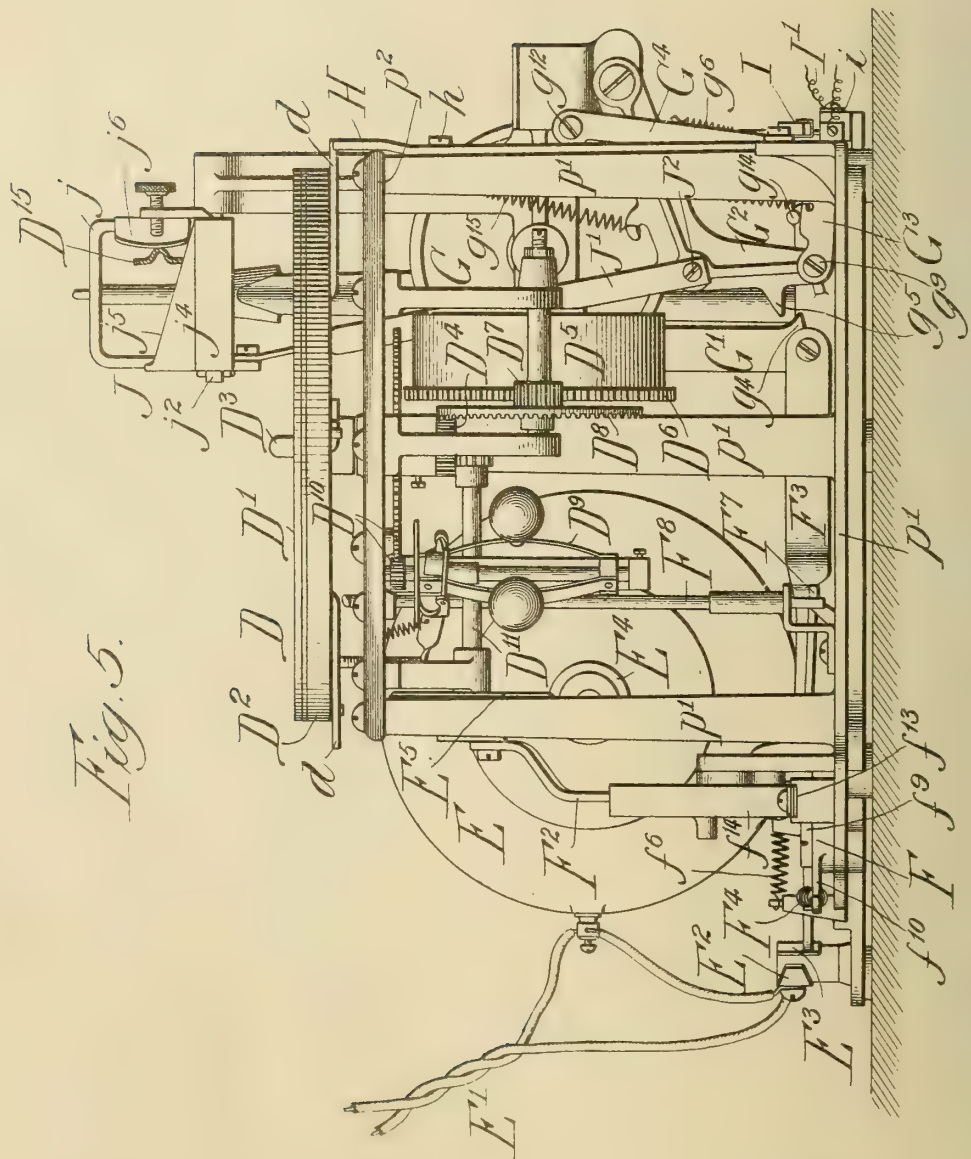


Fig. 5.

Witnesses:
Edw. C. Hughes
John Enders

Inventor
Herbert S. Mills,
 By *Dyrenforth Dyrenforth & Lee,*
Att'ys.

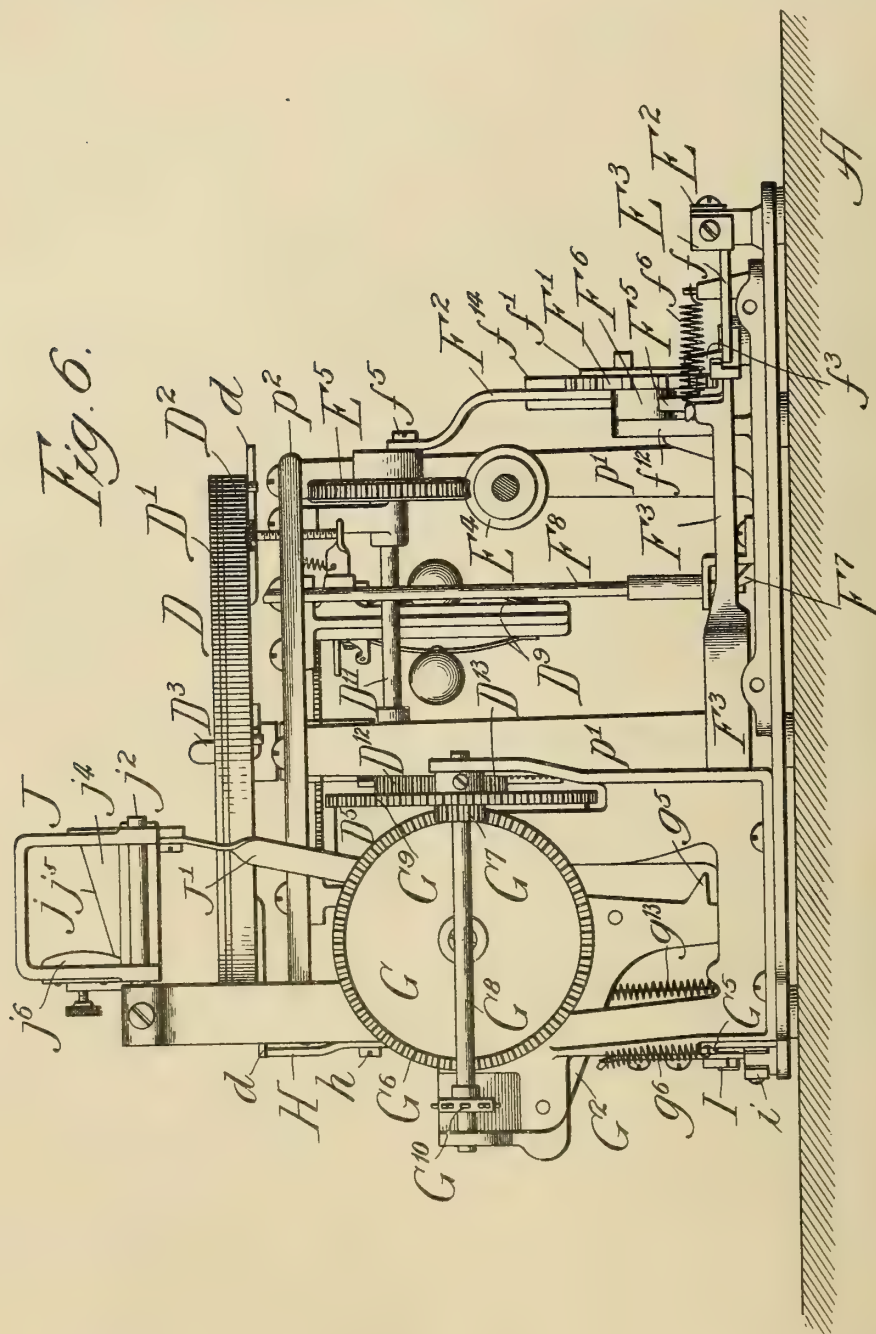


H. S. MILLS.
PHONOGRAPH MACHINE.
APPLICATION FILED FEB. 27, 1905.

Patented Aug. 3, 1909.

10 SHEETS--SHEET 6.

929,775.



Witnesses:
E. C. Dyer!
John Enders.

Inventor
Herbert S. Mills,
By Dyrenforth, Dyrenforth and Lee,
Att'ys.

H. S. MILLS.
 PHONOGRAPH MACHINE.

APPLICATION FILED FEB. 27, 1905.

929,775.

Patented Aug. 3, 1909.

10 SHEETS—SHEET 7.

Fig. 8.

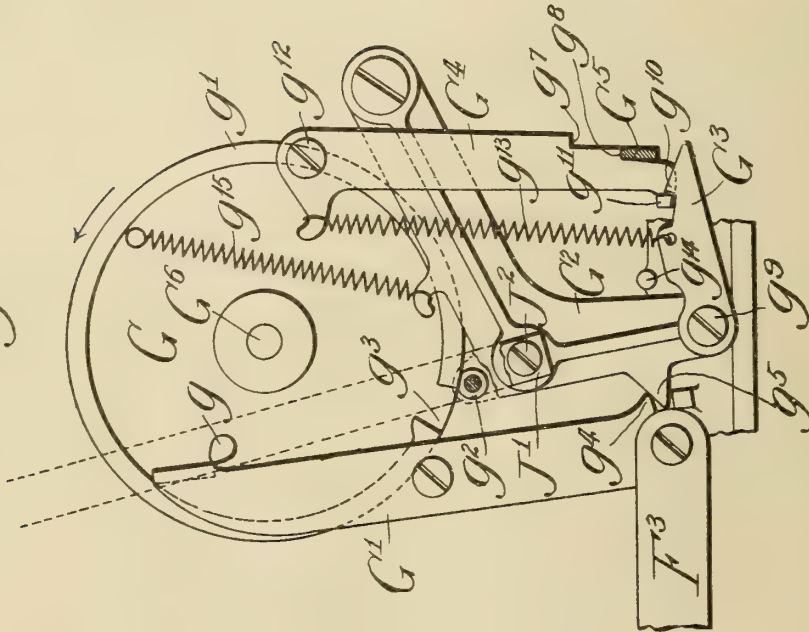
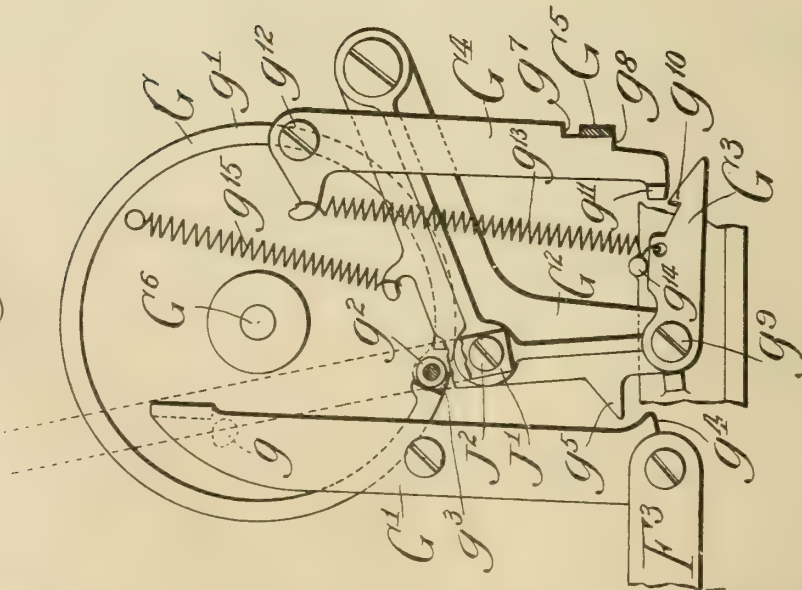


Fig. 7.



Witnesses:
 E. C. Byland.
 John Enders

Inventor
 Herbert S. Mills,
 By Depenforth, Depenforth & Lee,
 Att'ys.

929,775.

Fig. 9 and Fig. 10 are technical drawings of a mechanical device, likely a pump or engine component, shown in two different states or configurations. The device features a central vertical shaft (F¹) and a horizontal arm (F²) at the top. A spring (F³) is attached to the arm. The main body (F⁴) has a central chamber (F⁵) and a lower section (F⁶). A piston or plunger (F⁷) is located within the chamber. The device is supported by a base (F⁸) and has a handle (F⁹) at the bottom. Various other components are labeled with letters and numbers, including F¹⁰, F¹¹, F¹², F¹³, F¹⁴, F¹⁵, F¹⁶, F¹⁷, F¹⁸, F¹⁹, F²⁰, F²¹, F²², F²³, F²⁴, F²⁵, F²⁶, F²⁷, F²⁸, F²⁹, F³⁰, F³¹, F³², F³³, F³⁴, F³⁵, F³⁶, F³⁷, F³⁸, F³⁹, F⁴⁰, F⁴¹, F⁴², F⁴³, F⁴⁴, F⁴⁵, F⁴⁶, F⁴⁷, F⁴⁸, F⁴⁹, F⁵⁰, F⁵¹, F⁵², F⁵³, F⁵⁴, F⁵⁵, F⁵⁶, F⁵⁷, F⁵⁸, F⁵⁹, F⁶⁰, F⁶¹, F⁶², F⁶³, F⁶⁴, F⁶⁵, F⁶⁶, F⁶⁷, F⁶⁸, F⁶⁹, F⁷⁰, F⁷¹, F⁷², F⁷³, F⁷⁴, F⁷⁵, F⁷⁶, F⁷⁷, F⁷⁸, F⁷⁹, F⁸⁰, F⁸¹, F⁸², F⁸³, F⁸⁴, F⁸⁵, F⁸⁶, F⁸⁷, F⁸⁸, F⁸⁹, F⁹⁰, F⁹¹, F⁹², F⁹³, F⁹⁴, F⁹⁵, F⁹⁶, F⁹⁷, F⁹⁸, F⁹⁹, F¹⁰⁰, F¹⁰¹, F¹⁰², F¹⁰³, F¹⁰⁴, F¹⁰⁵, F¹⁰⁶, F¹⁰⁷, F¹⁰⁸, F¹⁰⁹, F¹¹⁰, F¹¹¹, F¹¹², F¹¹³, F¹¹⁴, F¹¹⁵, F¹¹⁶, F¹¹⁷, F¹¹⁸, F¹¹⁹, F¹²⁰, F¹²¹, F¹²², F¹²³, F¹²⁴, F¹²⁵, F¹²⁶, F¹²⁷, F¹²⁸, F¹²⁹, F¹³⁰, F¹³¹, F¹³², F¹³³, F¹³⁴, F¹³⁵, F¹³⁶, F¹³⁷, F¹³⁸, F¹³⁹, F¹⁴⁰, F¹⁴¹, F¹⁴², F¹⁴³, F¹⁴⁴, F¹⁴⁵, F¹⁴⁶, F¹⁴⁷, F¹⁴⁸, F¹⁴⁹, F¹⁵⁰, F¹⁵¹, F¹⁵², F¹⁵³, F¹⁵⁴, F¹⁵⁵, F¹⁵⁶, F¹⁵⁷, F¹⁵⁸, F¹⁵⁹, F¹⁶⁰, F¹⁶¹, F¹⁶², F¹⁶³, F¹⁶⁴, F¹⁶⁵, F¹⁶⁶, F¹⁶⁷, F¹⁶⁸, F¹⁶⁹, F¹⁷⁰, F¹⁷¹, F¹⁷², F¹⁷³, F¹⁷⁴, F¹⁷⁵, F¹⁷⁶, F¹⁷⁷, F¹⁷⁸, F¹⁷⁹, F¹⁸⁰, F¹⁸¹, F¹⁸², F¹⁸³, F¹⁸⁴, F¹⁸⁵, F¹⁸⁶, F¹⁸⁷, F¹⁸⁸, F¹⁸⁹, F¹⁹⁰, F¹⁹¹, F¹⁹², F¹⁹³, F¹⁹⁴, F¹⁹⁵, F¹⁹⁶, F¹⁹⁷, F¹⁹⁸, F¹⁹⁹, F²⁰⁰, F²⁰¹, F²⁰², F²⁰³, F²⁰⁴, F²⁰⁵, F²⁰⁶, F²⁰⁷, F²⁰⁸, F²⁰⁹, F²¹⁰, F²¹¹, F²¹², F²¹³, F²¹⁴, F²¹⁵, F²¹⁶, F²¹⁷, F²¹⁸, F²¹⁹, F²²⁰, F²²¹, F²²², F²²³, F²²⁴, F²²⁵, F²²⁶, F²²⁷, F²²⁸, F²²⁹, F²³⁰, F²³¹, F²³², F²³³, F²³⁴, F²³⁵, F²³⁶, F²³⁷, F²³⁸, F²³⁹, F²⁴⁰, F²⁴¹, F²⁴², F²⁴³, F²⁴⁴, F²⁴⁵, F²⁴⁶, F²⁴⁷, F²⁴⁸, F²⁴⁹, F²⁵⁰, F²⁵¹, F²⁵², F²⁵³, F²⁵⁴, F²⁵⁵, F²⁵⁶, F²⁵⁷, F²⁵⁸, F²⁵⁹, F²⁶⁰, F²⁶¹, F²⁶², F²⁶³, F²⁶⁴, F²⁶⁵, F²⁶⁶, F²⁶⁷, F²⁶⁸, F²⁶⁹, F²⁷⁰, F²⁷¹, F²⁷², F²⁷³, F²⁷⁴, F²⁷⁵, F²⁷⁶, F²⁷⁷, F²⁷⁸, F²⁷⁹, F²⁸⁰, F²⁸¹, F²⁸², F²⁸³, F²⁸⁴, F²⁸⁵, F²⁸⁶, F²⁸⁷, F²⁸⁸, F²⁸⁹, F²⁹⁰, F²⁹¹, F²⁹², F²⁹³, F²⁹⁴, F²⁹⁵, F²⁹⁶, F²⁹⁷, F²⁹⁸, F²⁹⁹, F³⁰⁰, F³⁰¹, F³⁰², F³⁰³, F³⁰⁴, F³⁰⁵, F³⁰⁶, F³⁰⁷, F³⁰⁸, F³⁰⁹, F³¹⁰, F³¹¹, F³¹², F³¹³, F³¹⁴, F³¹⁵, F³¹⁶, F³¹⁷, F³¹⁸, F³¹⁹, F³²⁰, F³²¹, F³²², F³²³, F³²⁴, F³²⁵, F³²⁶, F³²⁷, F³²⁸, F³²⁹, F³³⁰, F³³¹, F³³², F³³³, F³³⁴, F³³⁵, F³³⁶, F³³⁷, F³³⁸, F³³⁹, F³⁴⁰, F³⁴¹, F³⁴², F³⁴³, F³⁴⁴, F³⁴⁵, F³⁴⁶, F³⁴⁷, F³⁴⁸, F³⁴⁹, F³⁵⁰, F³⁵¹, F³⁵², F³⁵³, F³⁵⁴, F³⁵⁵, F³⁵⁶, F³⁵⁷, F³⁵⁸, F³⁵⁹, F³⁶⁰, F³⁶¹, F³⁶², F³⁶³, F³⁶⁴, F³⁶⁵, F³⁶⁶, F³⁶⁷, F³⁶⁸, F³⁶⁹, F³⁷⁰, F³⁷¹, F³⁷², F³⁷³, F³⁷⁴, F³⁷⁵, F³⁷⁶, F³⁷⁷, F³⁷⁸, F³⁷⁹, F³⁸⁰, F³⁸¹, F³⁸², F³⁸³, F³⁸⁴, F³⁸⁵, F³⁸⁶, F³⁸⁷, F³⁸⁸, F³⁸⁹, F³⁹⁰, F³⁹¹, F³⁹², F³⁹³, F³⁹⁴, F³⁹⁵, F³⁹⁶, F³⁹⁷, F³⁹⁸, F³⁹⁹, F⁴⁰⁰, F⁴⁰¹, F⁴⁰², F⁴⁰³, F⁴⁰⁴, F⁴⁰⁵, F⁴⁰⁶, F

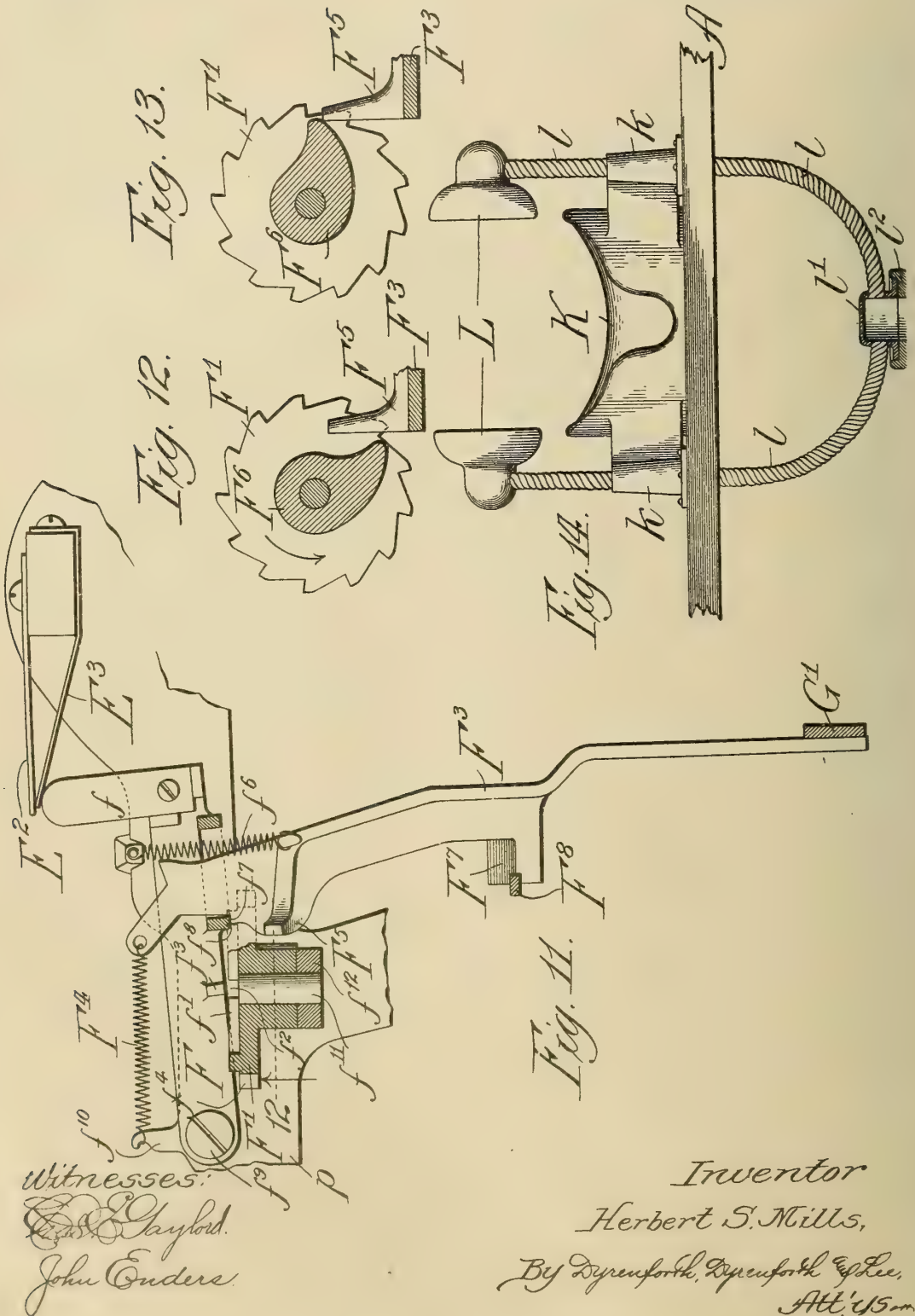
Witnesses:
 Jas. A. Gaylord.
 John Enders.

Inventor
Herbert S. Mills,
By Dyringforth, Dyringforth & Lee,
Att'ys in

H. S. MILLS.
 PHONOGRAPH MACHINE.
 APPLICATION FILED FEB. 27, 1905.

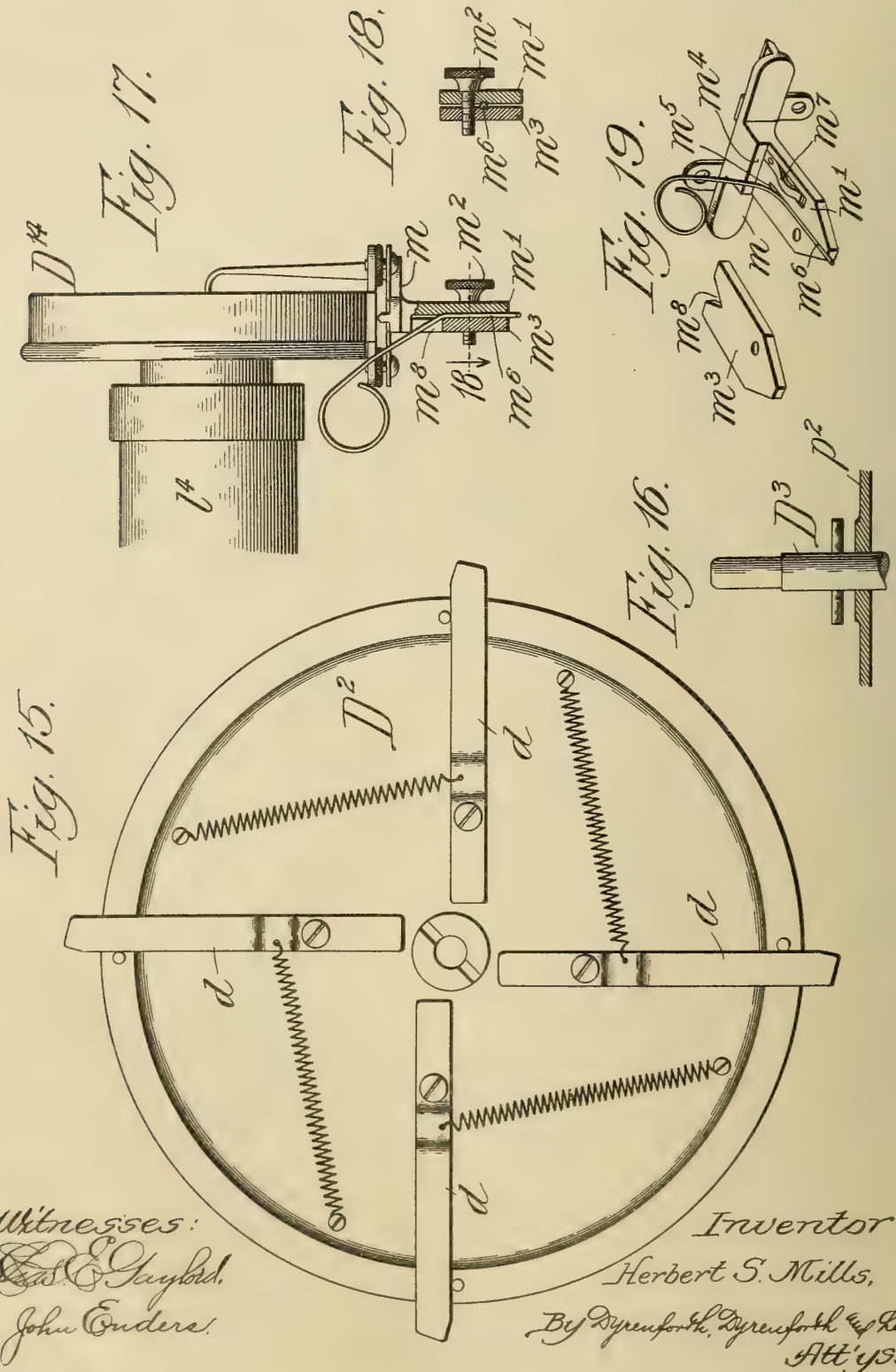
929,775.

Patented Aug. 3, 1909.
 10 SHEETS—SHEET 9.



929,775.

Patented Aug. 3, 1909.
 10 SHEETS—SHEET 10.



Witnesses:
 Ed. E. Gaylord,
 John Enders.

Inventor
 Herbert S. Mills,
 By Dyrenforth, Dyrenforth & Lee,
 Att'ys.

UNITED STATES PATENT OFFICE.

HERBERT S. MILLS, OF CHICAGO, ILLINOIS.

PHONOGRAPH-MACHINE.

No. 929,775.

Specification of Letters Patent.

Patented Aug. 3, 1909.

Application filed February 27, 1905. Serial No. 247,492.

To all whom it may concern:

Be it known that I, HERBERT S. MILLS, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Phonograph - Machines, of which the following is a specification.

My invention relates particularly to machines employing an electric motor for motive purposes, although the invention is applicable to machines employing any other form of motor as a primary source of power.

My primary object is to provide a machine wherein provision is made for winding the spring which serves to actuate the record of a phonograph by means of a motor which will operate for a predetermined period of time, when set in motion, thereby to give to the spring serving to actuate the record a predetermined tension.

In the accompanying drawings, my invention is shown embodied in a combined picture exhibiting and phonograph machine, the phonograph being of a well known type employing a disk-form record.

In the drawings—Figure 1 represents a side elevational view of my improved machine, portions of the casing being broken away to expose a part of the picture exhibiting device and portions of the phonograph; Fig. 1^a, a detail of a vibrative counteracting device employed in connection with a stop-actuating lever, which lever may be actuated by a coin or in any other suitable way; Fig. 2, a side elevational view of the phonograph and the mechanism connected therewith, shown as removed from the casing; Fig. 3, a reverse side elevational view of the same; Fig. 4, a plan view of the same; Fig. 5, a front view of the same; Fig. 6, a rear view of the same; Fig. 7, a broken section taken as indicated at line 7 of Fig. 2, showing a controlling wheel which serves to control the circuit of the electric motor shown and the stop-actuating lever mentioned, said view showing also the operative parts adjacent to said wheel; Fig. 8, a similar view showing a different position of the parts; Fig. 9, a broken sectional view taken as indicated at line 9 of Fig. 3 and showing the construction at and adjacent to the contacts of the motor circuit; Fig. 10, a similar view showing the parts in a different position; Fig. 11, a similar view showing the parts in still another position; Fig. 12, a broken section taken as in-

dicated at line 12 of Fig. 11; Fig. 13, a similar view showing the parts in a different position; Fig. 14, a detail of the eye and ear pieces of the machine; Fig. 15, a bottom plan view of the record-carrying disk showing the yielding stops thereon adapted to engage with the stop actuated by the lever mentioned above; Fig. 16, a detail of the record-actuating shaft; Fig. 17, a broken sectional view showing a detail of the phonograph stylus, the section being taken as indicated at line 17 of Fig. 2; Fig. 18, a section taken as indicated at line 18 of Fig. 17; and Fig. 19, a perspective view of the stylus-holder with the clamping-jaws thereof separated.

In the construction illustrated, A represents a casing which may be of any suitable design and which preferably has an upper compartment A¹ and a lower compartment A²; B, a picture exhibiting device which may be of any approved construction and which is mounted in the chamber A¹; C, a phonograph and mechanism connected therewith located in the chamber A²; K, the eye-piece of the machine; and L, the trumpets, or ear-pieces, of the machine.

Where the machine is coin-controlled, as illustrated, the casing A may be equipped with a coin-chute *a*, which terminates adjacent to the mechanism C in an enlargement *a*¹, which is provided at its front wall with a slot *a*² into which projects the free end of the stop-actuating lever mentioned above. Co-acting with said stop-actuating lever is a weighted spring-held lever *a*³ (Fig. 1^a), the purpose of which will be explained presently.

As stated, the picture exhibiting mechanism B may be of any desirable known construction. In Fig. 1, *b* represents the shaft (dotted) of this mechanism, and *b*¹ one of the picture-carrying arms thereof. The shaft *b* is equipped with a sprocket-wheel *b*² which is connected by a sprocket-chain *b*³ with the mechanism C.

The mechanism C comprises a phonograph D of known general construction having a disk-form record D¹, a record-bearing disk D², a record-actuating shaft D³ actuated by a pinion D⁴, a cylinder D⁵ equipped with the usual spring (not shown) and with a gear D⁶, a pinion D⁷ driven by the gear D⁶ and in turn driving a gear D⁸ meshing with the pinion D⁴, a governor D⁹ actuated by gears D¹⁰ from the shaft D³, a horizontal winding

shaft D¹¹ equipped (Fig. 6) with a pinion D¹² meshing with a pinion D¹³ through the medium of which the spring is wound in the usual manner, and a reproducer D¹⁴ mounted upon an arm D¹⁵ and coöperating with the record D¹; an electric motor E in an electric circuit E¹ energized from any suitable source and equipped with normally separated contact members E², E³; a worm E⁴ on the shaft of the motor E and meshing with a worm-wheel E⁵ secured on the winding-shaft D¹¹; a contact-actuating lever F (Figs. 4, 9, 10 and 11), equipped with an insulation finger *f* against which the contact E³ bears; a controlling-wheel F¹ for the lever F bearing a lateral annular flange *f*¹ provided with a notch *f*² adapted to receive a lug *f*³ on the lever F, said wheel being provided peripherally with ratchet-teeth *f*⁴; a spring-held actuating pawl F² joined by a pivot *f*⁵ to the wheel E⁵ and serving to actuate the wheel F¹; a spring-actuated cam-retracted member F³ through the medium of which the member F is actuated in the operation of closing the motor circuit, the member F³ being actuated by a spring *f*⁶ in said closing operation; a spring F⁴ tending normally to pull the free end of the member F³ forward, so that when said member is withdrawn by the controlling-wheel, which will be later described, a shoulder *f*⁷ will engage a shoulder *f*⁸ on the lever F, thereby to effect movement of the lever F when the member F³ returns under the action of its spring; a cam F⁵ (Figs. 6, 12 and 13), on the member F³ with which engages a cam F⁶ formed integrally with the wheel F¹, whereby the free end of the member F³ is forced rearwardly after the wheel F¹ starts to rotate and the lug *f*³ is engaged by the flange *f*¹ of the wheel; a stop-actuating cam F⁷ on the member F³ which serves to elevate a stop F⁸ whose upper end will thus be brought into the path of stops on the record-supporting plate D²; a wheel G (Figs. 7 and 8), serving through the medium of a lever G¹ to withdraw the member F³ against the tension of its spring at the proper time, and serving also through the medium of a lever G² and a pawl G³ to withdraw the latch G⁴ of a stop-actuating lever G⁵; a gear G⁶ formed integrally with the wheel G and actuated by a pinion G⁷ secured on a shaft G⁸ and equipped with a gear G⁹ which meshes with the gear D⁶, by which it is actuated; a sprocket-wheel G¹⁰ on the shaft G⁸ and which actuates the sprocket-chain *b*³ connected with the picture exhibiting mechanism; a stop H connected with the lever G⁵ (Figs. 1 and 4), which stop co-acts with stops on the record-supporting disk D²; a circuit-closing member I carried by the lever G⁵ and adapted to close the circuit I¹ of an electric light I², which serves to illuminate the pictures; and a pivotally supported reproducer-shifter J connected by a member J¹ (Fig. 5) with a

stud J² carried by the elbow of the lever G² (Fig. 8).

The general construction of the phonograph D need not be described more at length. The record D¹ and its supporting plate D² are readily removable from the shaft D³. For the purposes of the present invention, I have provided the member D², on its lower side, with yielding substantially radial stops *d*, whose outer ends project somewhat beyond the circumference of the disk, as shown in Fig. 15. These stops may be engaged by either or both of the stops F⁸ and H. The function of the stop H is to control the movement of the record of the phonograph in ordinary use; and, in coin-controlled machines, the stop H is actuated ordinarily by a coin through the medium of the lever G⁵. The function of the stop F⁸ is to prevent further rotation of the record, after the machine has once operated, until the motor has been set in operation to re-wind the spring of the phonograph, whereby a desirable tension is always maintained on the phonograph spring, the spring never being allowed to run down. The worm driven wheel E⁵ takes the place of the winding key of the ordinary manually wound phonograph of this type.

The motor circuit may be provided with a fuse (none shown). The contacts E², E³ preferably comprise two normally separated spring-metal members, the member E³ being capable of being forced into engagement with the member E² and returning under its own resiliency to the open position.

The contact-actuating member F is equipped near its pivot *f*⁵ with a short arm *f*¹⁰, and the spring F⁴ joins the arm *f*¹⁰ to the free end of the member F³. Thus, it will be understood that the lug *f*³ tends normally to enter the recess *f*² in the flange *f*¹ of the wheel F¹. The wheel F¹ is mounted on a stud *f*¹¹ carried by a frame member *f*¹². The wheel F¹ is guarded against retrograde movement by a spring *f*¹³. The pawl F² is held in engagement with the ratchet-teeth *f*⁴ by a spring *f*¹⁴.

The wheel G is provided on its front surface with a cam-lug *g* adapted to engage the upper end of the lever G¹ and actuate said lever during each revolution of the wheel G. The parts are so timed that the wheel G makes one revolution by about the time the record has been completely traversed by the stylus of the reproducer. When the lever G¹ is relieved from the action of the cam-lug *g*, the member F³ is permitted to return under the action of its spring and close the motor circuit. The wheel G has a smooth circumferential surface *g*¹, upon which rides a roller *g*² carried by the member G², the periphery of the wheel being provided with a recess *g*³ which the roller may enter after the wheel completes its revolution. The parts

are timed so that the roller will enter the recess g^3 an instant before the cam-lug g releases the lever G^1 , and the lower end of the lever G^1 is provided with a locking shoulder g^4 which engages a shoulder g^5 with which the member G^2 is provided, so that, although the wheel G may allow the member G^2 to rise slightly before the member G^1 is released from the lug g , this action nevertheless will not be permitted to occur until after movement of the lever G^1 . The lever G^3 has its free end held normally elevated by a spring g^6 , as shown in Fig. 2. The latch G^4 is provided with a locking shoulder g^7 , which corresponds with the elevated position of the lever G^5 , and a locking shoulder g^8 , which corresponds with the depressed position of said lever. The pawl G^3 is connected by a pivot g^9 with the lever G^2 , and is provided with a hook g^{10} adapted to engage a lug g^{11} with which the locking pawl G^4 is provided. The pawl G^4 is supported from the frame on a pivot g^{12} and is provided with a short arm connected by a spring g^{13} with the pawl G^3 , whereby the tendency of the lower end of the pawl G^4 is to move outwardly and the tendency of the free end of the pawl G^3 is to move upwardly. On the frame is provided a stop g^{14} which is engaged by the pawl G^3 to cause it to release its hold upon the pawl G^4 during the upward movement of the free end of the lever G^2 . The purpose of this action is to permit the pawl G^4 to assume its normal condition in readiness to lock the lever G^5 when the latter is again depressed. The spring g^{15} connected with the lever G^2 and with a projection g^{16} (Fig. 2) on a frame member tends normally to elevate the free end of said lever.

The stop H comprises a vertically movable bar provided with a slot through which passes a stud h supported by the frame.

The circuit-closing member I is adapted to be forced between contact members i in the circuit I^1 , when the lever I is depressed, so that the light I^2 will be turned on at the moment the phonograph starts to operate.

The reproducer-shifter J comprises a frame j supported on a horizontal pivot j^2 , the member J^1 having pivotal connection j^3 with the member j in front of the pivot j^2 . The front portion of the member J is equipped with a cam j^4 having an inclined surface j^5 which tends normally to hold the arm D^{15} of the reproducer over against an adjustable spring-stop j^6 at one side of the frame j , whereby the reproducer is held in a proper position to be lowered upon the record at its outer margin. When the stop-actuating lever G^5 is depressed and the spring-driven train of the phonograph allowed to operate the phonograph, the wheel G is caused to turn, owing to its connection with the driving-train of the phonograph, and the roller g^2 is forced out of the recess g^3 in said wheel, be-

ing moved from the position shown in Fig. 7 to the position shown in Fig. 8. This immediately depresses the front end of the reproducer-shifter, through the medium of the connecting member J^1 , which is actuated by the lever G^2 . During the revolution of the wheel G , the lever G^2 is held depressed, so that the cam j^5 is held out of the way of the arm D^{15} until the reproducer has completed its travel across the record, whereupon, the lever G^2 rising, the cam j^4 is elevated, thereby raising the reproducer and causing it to shift back to its starting position with the arm D^{15} raising against the yielding stop j^6 .

The construction of the members K and L will be best understood by reference to Figs. 1 and 14. The eye-piece K is of the usual form for such purposes, and is provided with perforate lugs k through which the flexible metallic tubes l of the ear-trumpets extend. The tubes l are joined to a cap-shaped piece l^1 which connects with a fixedly supported member l^2 carried by the frame and connected with a tube l^3 , which in turn, is joined to the horn l^4 of the phonograph. The tubes l slide freely through the perforate lugs k and the corresponding holes in the casing, enabling the trumpets to be adjusted to the requirements of the persons using the machine.

A detail of the construction of the reproducer D^{14} is shown in Figs. 17 to 19 inclusive. the reproducer-head is equipped with a bracket m of the usual construction, except that it is provided with a jaw m^1 with which is connected, by means of a screw m^2 a removable jaw m^3 . The free ends of the jaws are tapered, as shown. The base end of the jaw m^3 abuts against a shoulder m^4 with which the bracket m is provided. A longitudinal channel m^5 in the jaw m^1 serves to receive the stylus wire m^6 , and a spring m^7 serves to separate the jaws when the screw is upturned. The removable jaw m^3 is provided at its base end with a channel m^8 through which the rear end of the fine wire constituting the stylus projects. The stylus is thus firmly clamped between the jaws, and may be readily adjusted to compensate for wear, the rear portion of the wire serving as a means for forcing the wire through in the adjusting operation.

The frame which supports the phonograph and the winding-motor may be of any suitable construction. Preferably, it comprises integrally formed bottom members p and standards p^1 , the standards being surmounted by the usual top plate p^2 which supports the main portion of the mechanism of the phonograph proper and in which the record-actuating shaft D^3 is journaled.

The mode of operation may be briefly summarized thus: The motor E is preparatorily operated to give to the spring of the spring-driven train of the phonograph a desired tension, which tension is greater than is actually

required to turn the record until the reproducer has fully traversed it, thereby insuring adequate power and a desirable rate of rotation of the record at all times. The motor

5 circuit may be closed in any suitable way to effect the initial winding of the phonograph spring. The wheel F^1 is preparatorily ad-
 10 justed so that after the spring of the phonograph has been preparatorily wound the notch f^2 receives the lug f^3 of the contact-
 15 shifter F , whereby the wheel F^1 is locked and the motor circuit left normally open. Assuming the friction-brake which constitutes
 20 a portion of the governor D^9 to be preparatorily set to control the rate of rotation of the record and the spring of the spring-motor
 25 of the phonograph to be properly wound, the lever G^5 may be depressed, as by means of a coin, thereby to withdraw the stop H
 30 and permit the record to turn. As soon as the record begins to turn, the wheel G driven from the spring-motor begins to turn also
 35 and depresses the lever G^3 , thereby tilting the front end of the reproducer-shifter J downwardly and allowing the reproducer to
 40 drop until the stylus engages the record. As the wheel G nears the end of its revolution, the cam g operates the lever G^1 and withdraws
 45 the member F^3 from the position shown in Fig. 9 to the position shown in Fig. 10, the spring F^4 operating at the same time to draw
 50 the free end of the member F^3 forwardly so that the shoulder f^7 will be in position to engage the shoulder f^8 upon the return move-
 55 ment of the member F^3 . When the cam-stud g releases the lever G^1 the spring f^6 returns the member F^3 to approximately its
 60 normal position, thereby forcing the member F outwardly and closing the motor circuit. In the movement of the member F the wheel
 65 F^1 is unlocked, and immediately the winding wheel E^5 is set in operation the pawl F^2 begins to turn the wheel F^1 . The first effect of
 the movement of the wheel F^1 is to bring the flange f^1 along side the lug f^3 in readiness to prevent return of the member F until the
 wheel F^1 has completed a revolution. In the first movement of the wheel F^1 , also, the cam F^6 engages the projection F^5 on the
 member F^3 , thereby moving the free end of said member rearwardly and effecting its release from the member F . After this re-
 lease of the member F^3 from the position shown in Fig. 11, the stop F^8 drops to the position shown in Fig. 9, where it forms a stop
 for the member F^3 . It will be seen, therefore, that when the wheel F^1 completes its rotation the member F is free to swing in-
 wardly until the lug f^3 has fully entered the recess f^2 .

Returning now to the action which occurred when the wheel started to rotate, it should be stated that the effect of depressing the lever G^3 was to cause the pawl G^3 to inter-
 lock with the pawl G^4 , and it will be seen,

therefore, that when the wheel G completes its revolution and the roller g^2 enters the recess g^3 the pawl G^4 will be caused to release the lever G^5 (with which it made engagement when the lever G^5 was depressed), and an instant later the pawl G^3 will be caused to re-
 70 lease the pawl G^4 , leaving the latter free to engage the lever G^5 upon a subsequent depression thereof. It should be pointed out, also, that the stop F^8 , which is normally de-
 75 pressed, and free from the path of the stops d on the record-supporting disk, has its lower end engaged by the inclined surface of the cam F^7 when the member F^3 returns under the action of its spring to force the contact-
 80 actuating member F outwardly, and when the cam F^6 forces the free end of the member F^3 rearwardly the stop F^8 drops off the cam F^7 and occupies the position shown in Fig. 9. Thus, it will be seen that the stop F^8 is held
 85 in an elevated position preventing the rotation of the record, until the electric motor has started to re-wind the spring of the spring-motor, so that said spring is prevented from running down. It should be added,
 90 as is apparent from Fig. 15, any excessive winding of the spring of the spring-motor would be relieved by a rotation of the record, the stops d yielding to pass the stop H , there-
 95 by preventing breakage. Moreover, the yielding of the stops d breaks the shock which otherwise would occur when the record is stopped at the end of the operation.

Where a coin is depended upon for depressing the stop-actuating lever G^5 , there is danger of the lever being lowered by jarring the machine, and in such case the lever a^3 is caused to vibrate in a manner to counteract the movement of the stop-actuating lever, thereby to prevent fraudulent use of the ma-
 105 chine.

It will be obvious that many changes in details of construction within the spirit of my invention may be made, hence no undue limitation should be understood from the foregoing detailed description.

It is believed to be novel to employ what for the purpose of this application will be termed a primary motor, operated from any suitable source of power to wind a spring-motor, the primary motor being automati-
 115 cally set in operation by the action of the spring-motor and operating to produce a pre-determined winding effect upon the spring-motor and finally being automatically
 120 stopped. It is to be understood, therefore, that the appended claims are intended to cover the invention in its widest application, regardless of the particular use to which the invention may be put.

As is well understood, electric currents of the same nominal voltage vary at different plants throughout the country, so that an electric motor can not be used without great limitations for the direct actuation of a
 125 130

phonograph, the number of the rotations of the record in which must be subject to very little variation. Furthermore, the provision of means for quickly and readily winding the
 5 spring-motor of a phonograph of the type herein shown and for insuring the proper degree of winding is regarded as of great importance.

What I regard as new, and desire to secure
 10 by Letters Patent, is—

1. The combination with a phonograph having a spring-motor, of an element driven thereby, a stop co-acting with said element, an electric winding-motor having a circuit,
 15 circuit-controlling mechanism actuated by said spring-motor, and mechanism controlled from said spring-motor serving to withhold said stop for a predetermined period to permit rotation of said element, for the purpose
 20 set forth.

2. The combination with a phonograph having a spring-motor, of an electric winding-motor having a circuit, circuit-controlling mechanism actuated by said spring-motor, a record-stop, and a locking device for
 25 said record-stop controlled by said circuit-controlling mechanism, for the purpose set forth.

3. The combination with a phonograph
 30 having a disk-form record, a reproducer co-acting with said record and a spring-motor to actuate the record, of a winding-motor, a reproducer-shifter, and mechanism actuated by said spring-motor and serving to start and
 35 stop the winding motor and operate said reproducer-shifter, for the purpose set forth.

4. The combination with a phonograph having a spring-motor and a shiftable reproducer, of a winding-motor connected
 40 with said spring-motor, a reproducer-shifter, and a controlling-wheel operated by said spring-motor and controlling the winding-motor and actuating the reproducer-shifter, for the purpose set forth.

5. The combination with a phonograph having a reproducer and a spring-motor provided with a winding-shaft, of an electric winding-motor geared to said winding-shaft, a contact-controlling-wheel actuated with
 50 said winding-shaft in the operation of the winding-motor, a motor circuit having a contact controlled by said wheel, circuit-controlling mechanism operated by the spring-motor during the actuation of the
 55 record, and a reproducer-shifter actuated from said spring-motor, for the purpose set forth.

6. The combination with a phonograph having a spring-motor and a rotary record,
 60 of a winding-motor, controlling mechanism for the winding-motor actuated by the spring-motor, and a record-stop actuated by

said controlling mechanism, for the purpose set forth.

7. The combination with a phonograph 65 having a spring-motor and a rotary record, of a winding-motor, controlling mechanism for the winding-motor actuated by the spring-motor, and a record-stop thrown into the operative position during the operation
 70 of starting the winding-motor and thrown out of operative position before the winding-motor has completed its operation, for the purpose set forth.

8. The combination with a phonograph 75 having a spring-motor and a rotary record, of a record-stop, an actuating lever therefor, a latch for said lever, and mechanism operated by the spring-motor and controlling said latch, for the purpose set forth. 80

9. The combination with a phonograph having a spring-motor and a rotary record, of a stop for the record, an actuating member for the stop, a latch for said actuating member, a pawl serving to retract said latch, a
 85 pawl-actuating member, and a wheel controlling the movement of said pawl-actuating member, for the purpose set forth.

10. The combination with a phonograph having a spring-motor and a rotary record, 90 of a stop for the record, an actuating member for said stop, a rotary wheel controlling said actuating member, a reproducer-shifter, and means actuated by said wheel and serving to actuate said reproducer-shifter, for the pur- 95 pose set forth.

11. The combination with a phonograph having a spring-motor and a rotary record, of an electric winding-motor, a circuit-controlling member, a wheel actuated by the 100 spring-motor, a record-stop, and actuating means for the record-stop having interlocking connection with the circuit-controlling member, for the purpose set forth.

12. The combination with a phonograph 105 having a rotary record and a projecting stop, of a vertically movable stop co-acting therewith, and an actuating lever connected with said vertically movable stop, for the purpose set forth. 110

13. The combination with a phonograph having a record, a reproducer co-acting with said record and a spring-motor to actuate the record, of a winding-motor, a reproducer shifter supported on a horizontal pivot extending transversely of the reproducer arm, 115 a link connected therewith, and a controlling wheel actuated by the spring-motor and controlling the movements of said link.

HERBERT S. MILLS.

In presence of—

J. H. LANDES,

L. HEISLAR.



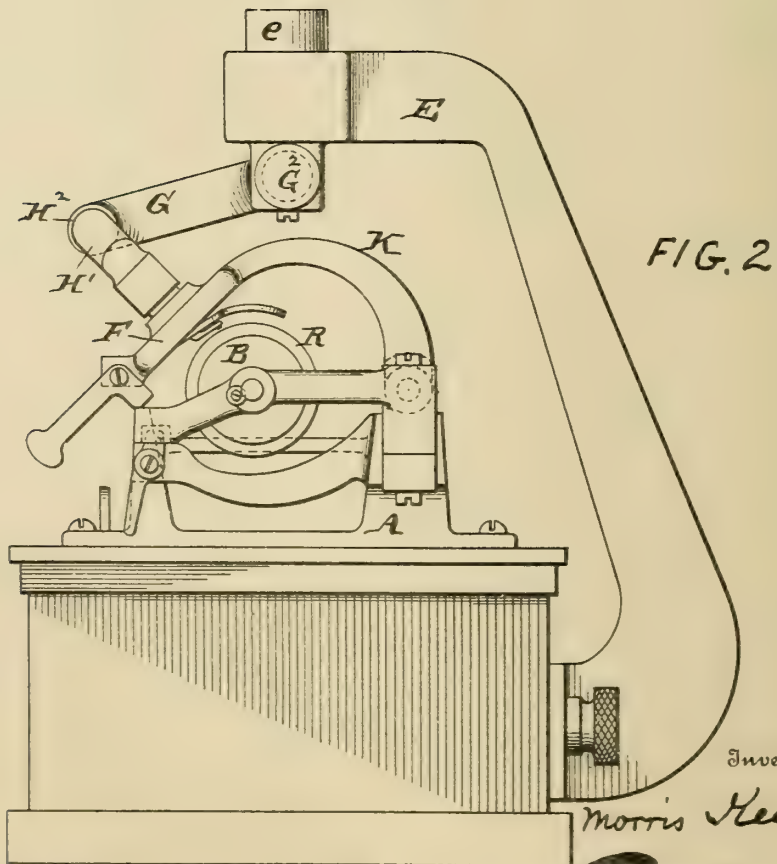
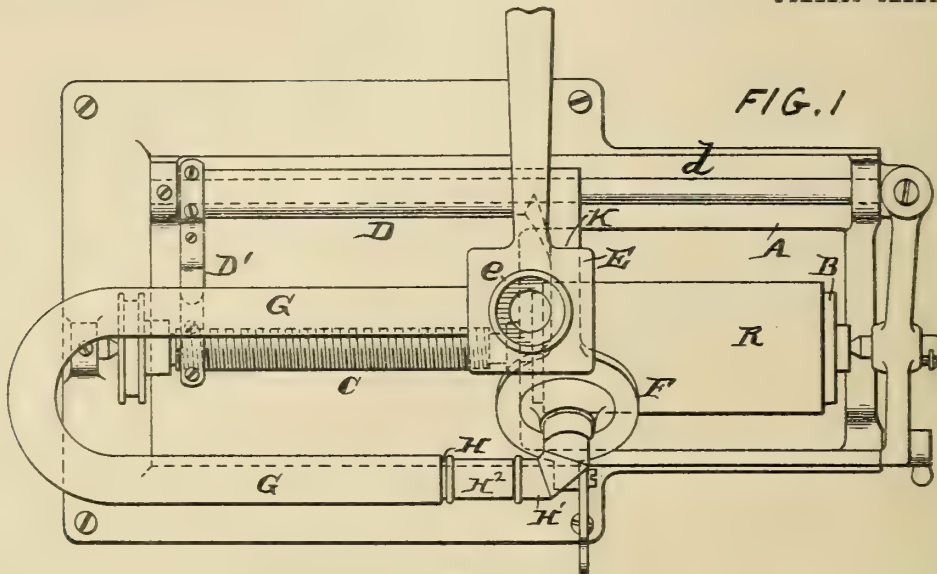


M. KEEN.
SOUND REPRODUCING MACHINE.
APPLICATION FILED APR. 4, 1907.

929,859.

Patented Aug. 3, 1909.

2 SHEETS—SHEET 1.



Witnesses

Danl. Webster, Jr.
A. M. Kelly

By

Inventor

Morris Keen

[Signature]
Attorney

M. KEEN.
SOUND REPRODUCING MACHINE.
APPLICATION FILED APR. 4, 1907.

929,859.

Patented Aug. 3, 1909.

2 SHEETS—SHEET 2.

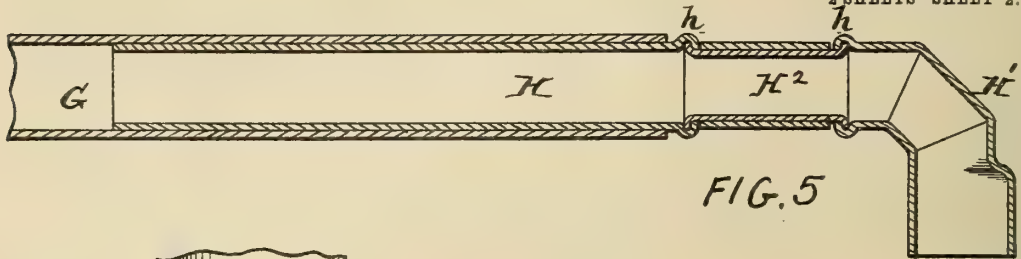


FIG. 5

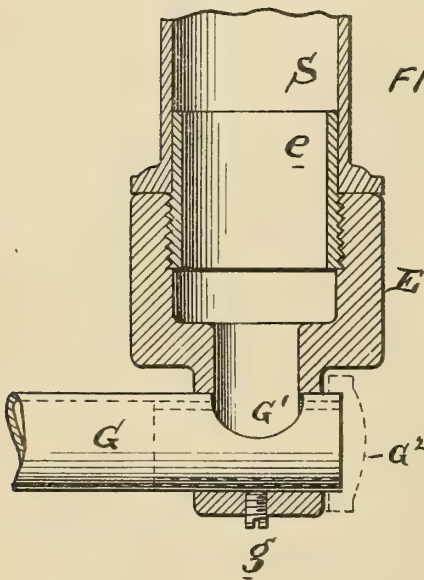


FIG. 4

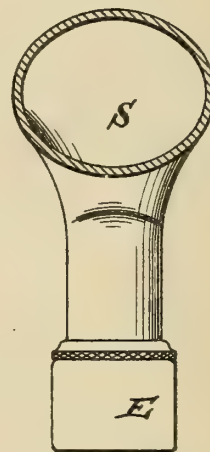


FIG. 6

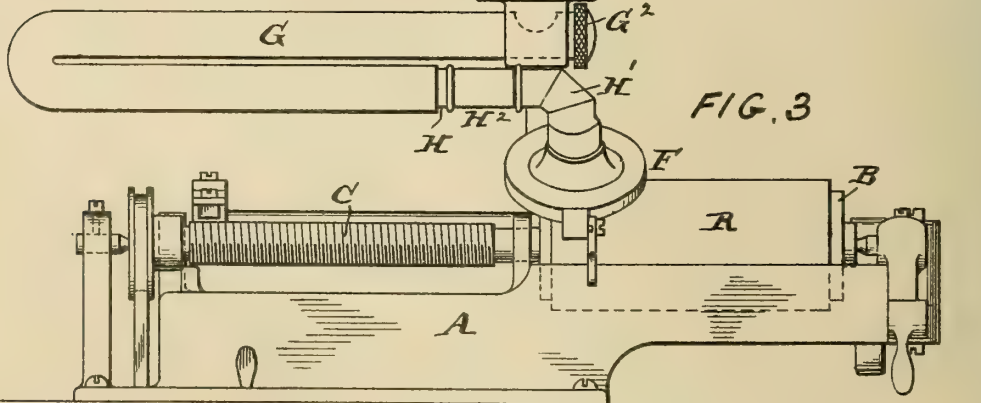


FIG. 3

Inventor

Morris Keen

Witnesses

Daniel Webster, Jr.
A. M. Kelly.

By

[Signature]

Attorney

UNITED STATES PATENT OFFICE.

MORRIS KEEN, OF PHILADELPHIA, PENNSYLVANIA.

SOUND-REPRODUCING MACHINE.

No. 929,859.

Specification of Letters Patent.

Patented Aug. 3, 1909.

Application filed April 4, 1907. Serial No. 366,243.

To all whom it may concern:

Be it known that I, MORRIS KEEN, of the city and county of Philadelphia and State of Pennsylvania, have invented an Improvement in Sound-Reproducing Machines, of

5 which the following is a specification.
My invention has reference to sound reproducing machines and consists of certain improvements which are fully set forth in the following specification and shown in the accompanying drawings which form a part thereof.

10 The object of my invention is to provide a sound reproducing machine, of the phonograph and graphophone types, with means whereby the sound box or reproducing head may travel longitudinally over the length of the record cylinder and at the same time the distribution of the sound be made by a horn supported in a fixed position, the result being that the weight of the horn is not carried to any extent by the sound box carriage and does not interfere in any way with the operation of the reproducing apparatus. By supporting the horn separately in a machine of this class it may be adjusted at any angle or position. The weight of the horn being removed from the sound box carriage, the latter travels more smoothly and with less power. The adjustment of the machine is more easily effected and in general, the apparatus is more stable and easily manipulated.

15 My invention consists in providing the phonograph or graphophone instrument with a stationary bracket or arm wholly supporting the horn and combining therewith an adjustable tubular connection between the traveling sound box and the stationary bracket for transmitting the air vibrations to the fixed horn when embodying the general features of construction defined in the claims.

20 My invention also comprehends details of construction which, together with the features above specified, will be better understood by reference to the drawings, in which:—

25 Figure 1 is a plan view of a sound reproducing machine embodying my invention; Fig. 2 is an end elevation; Fig. 3 is a front elevation; Fig. 4 is a sectional view showing the connection of the adjustable tubular arm and bracket; Fig. 5 is a sectional view of the adjustable tubular connection or arm; and

Fig. 6 is a cross section of the plug for adjusting the sound opening to the horn.

A is the main frame of the instrument; B is the record tablet drum; C is the driving shaft and feed screw; D is the traveling carriage having the arm D' making engagement with the feed screw and by which the carriage is moved; *d* is the carriage guide; K is the sound box carrying arm extending from the carriage; and F is the sound box or reproducer head which may be of any suitable construction. R is the record cylinder carried by the drum B. These parts are such as are found embodied in phonograph and graphophone instruments now on the market.

30 Secured rigidly to the base of the machine is a bracket E which extends upward over the upper portion thereof. The upper end of the bracket E is formed with a tubular portion provided at the top with a bushing *e* upon which the base or small end of a horn S is fitted as shown in Figs. 3 and 4. The horn is thus supported in such a manner that its weight is carried wholly by the bracket E. It may also be adjusted about a vertical axis so as to direct the sounds away from the machine as may be desired, the horn having capacity for adjustment throughout 360 degrees.

35 Supported by the bracket E and communicating with the horn through the aperture in the head of the said bracket, is the goose neck tubular arm G, one arm of which is secured to the bracket and the other end free. The free end of this tubular arm is parallel to the axis of the shaft C and record drum B. Sliding in this tubular arm is a tube H which is connected with the sound box F by an elbow H' attached to the sound box case and a universal joint H² comprising a short tube having a loose flange and groove connection at *h* with said parts H and H', as clearly shown in Fig. 5. In this manner the movement of the sound box will cause the tube H to slide in the tubular arm G so that at all times in its movement the sound box will be in communication with the fixed horn. It is evident that the essential feature of the construction resides in providing an adjustable tubular connection for the air pulsations between a fixedly supported horn and a rectilinearly movable and positively fed sound box, and hence I do not restrict myself to the particular means herein shown.

it being evident to one skilled in the art that other suitable modified forms of such connections may be employed in lieu of those illustrated.

5 To vary the sound emitted from the horn, I provide a valve or plug G^2 which fits into the end of the tubular part G where it is secured to the head of the bracket. This valve G^2 is formed like a tube, closed at one
10 end and having a lateral opening G^3 adapted to come into alinement with a similar lateral opening G' in the tubular part G within the head of the bracket and below the horn. By rotating the valve or plug G^2 the orifice G'
15 may be more or less throttled to vary the freedom of passage of the air vibrations. In this way the music or sounds may be subdued when desired.

The tubular connection shown, comprising
20 the parts G , H , form a telescopic joint, but other forms of joints or adjustable tubular connections may be employed if so desired.

Having now described my invention, what I claim as new and desire to secure by Letters Patent, is:—

1. In a sound reproducing machine, the combination of a rectilinearly movable sound box or reproducer, means for guiding and supporting the said sound box, a bracket
30 having a tubular end, a horn having its weight supported by the bracket but adjustable circumferentially thereon, mechanical devices for positively feeding the sound box relatively to the horn, and an adjustable
35 tubular connection between the sound box and the tubular end of the bracket and formed of a plurality of telescoping members arranged parallel to the line of travel of the sound box, part of said members
40 being secured to the bracket independently of the horn and part of said members being secured to the sound box.

2. In a sound reproducing machine, the combination of a rectilinearly movable
45 sound box or reproducer, means for guiding and supporting the said sound box, a bracket having a tubular end, a horn having its weight supported by the bracket but adjustable circumferentially thereon, and an
50 adjustable tubular connection between the sound box and the tubular end of the bracket consisting of telescoping parts of rigid material, one of which is connected with and supported by the bracket by a
55 goose neck independently of the horn and the other with the sound box and extending therefrom parallel to the line of travel of the sound box.

3. In a sound reproducing machine, the combination of a rectilinearly movable
60 sound box or reproducer, means for guiding and supporting the said sound box, mechanical devices for positively feeding the sound box relatively to the horn, a bracket
65 having a tubular end, a horn having its

weight supported by the bracket but adjustable circumferentially thereon, and an adjustable tubular connection between the sound box and the horn consisting of a fixed tubular part supported by the bracket
70 and having a long tubular part parallel to the travel of the sound box and a sliding straight tubular part telescoping with the fixed tubular part and connected to and moving with the sound box through the
75 medium of a flexible joint.

4. In a sound reproducing machine, the combination of a rectilinearly movable sound box or reproducer, means for guiding and supporting the said sound box, a bracket
80 having a tubular end, a horn having its weight supported by the bracket but adjustable circumferentially thereon, an adjustable tubular connection between the sound box and bracket, and a valve for
85 throttling the sound vibrations arranged in the tubular end of the bracket so as to be fixedly supported during the travel of the sound box.

5. In a sound reproducing machine, the combination of a rectilinearly movable
90 sound box, means to rotate a sound record, means for guiding and supporting said sound box, a fixed support independent of the sound box and also of the horn and
95 having a tubular part, a horn having its weight wholly supported by the fixed support and having its smaller end detachably connected to one end of the tubular part of the said support, and a tubular connection
100 between the sound box and the other end of the tubular part of the support consisting of telescopic sections of rigid material one of which sections is connected with the tubular part of the fixed support and independent of the horn and held in fixed
105 position relatively to the means for rotating the sound record, and the other section connected with the sound box and sliding on the first mentioned fixedly supported section.
110

6. In a sound reproducing machine, the combination of a fixed horn supporting bracket, a horn wholly supported by and adjustable thereon, a mechanically pro-
115 pelled sound box, and an adjustable tubular connection between the bracket and the sound box consisting of two telescoping parts one of which is stationary and supported by the bracket and the other con-
120 nected with the sound box and having a long tubular part extending parallel to the direction of travel of the sound box and united to the sound box by a flexible joint to compensate for irregularities in the aline-
125 ment of the parts in operation.

7. In a sound reproducing machine, the combination of a rectilinearly movable sound box or reproducer, means for guiding and supporting the said sound box, a fixed
130

support having a tubular bearing, a horn
having its weight supported by the bearing
but adjustable circumferentially thereon,
and an adjustable tubular connection be-
5 tween the sound box and the bearing con-
sisting of telescoping parts one of which is
connected with and supported by the bear-
ing independently of the horn and having
a tubular portion fixedly arranged parallel
10 to the line of travel of the sound box and

the other of said parts connected with the
sound box and having a sliding connection
with the tubular portion of the first men-
tioned part.

In testimony of which invention, I have
hereunto set my hand.

MORRIS KEEN.

Witnesses:

R. M. HUNTER,

R. M. KELLY.

G. BURTON & A. E. BURSON.
 BRAKE MECHANISM FOR TALKING MACHINES.
 APPLICATION FILED DEC. 28, 1907.

Patented Aug. 3, 1909.
 2 SHEETS-SHEET 1.

930,038

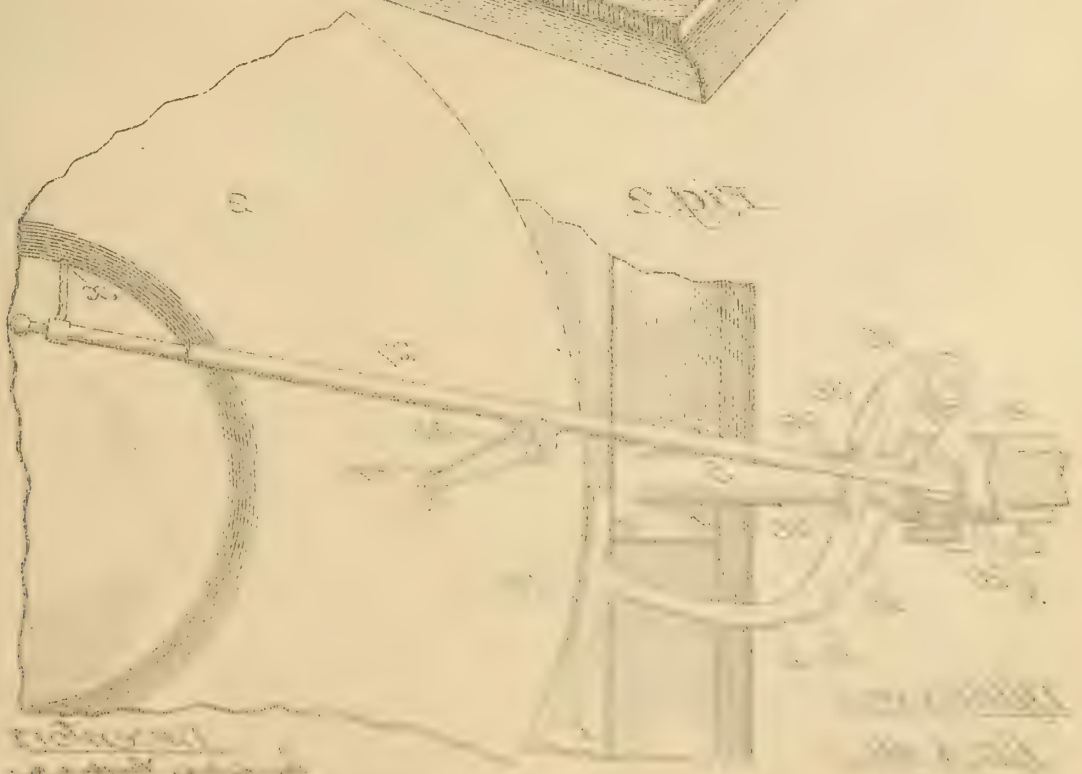
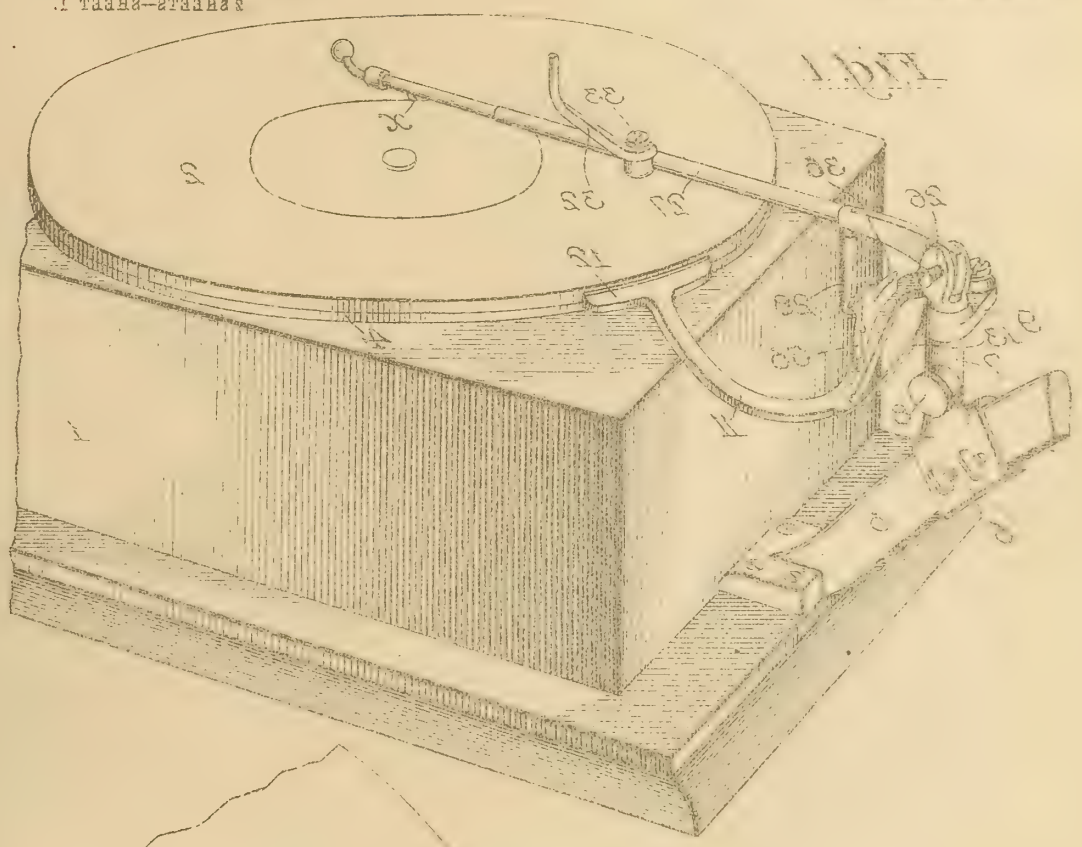


Fig. 1
 Fig. 2
 Fig. 3
 Fig. 4
 Fig. 5
 Fig. 6
 Fig. 7
 Fig. 8
 Fig. 9
 Fig. 10
 Fig. 11
 Fig. 12
 Fig. 13
 Fig. 14
 Fig. 15
 Fig. 16
 Fig. 17
 Fig. 18
 Fig. 19
 Fig. 20
 Fig. 21
 Fig. 22
 Fig. 23
 Fig. 24
 Fig. 25
 Fig. 26
 Fig. 27
 Fig. 28
 Fig. 29
 Fig. 30
 Fig. 31
 Fig. 32
 Fig. 33
 Fig. 34
 Fig. 35
 Fig. 36
 Fig. 37
 Fig. 38
 Fig. 39
 Fig. 40
 Fig. 41
 Fig. 42
 Fig. 43
 Fig. 44
 Fig. 45
 Fig. 46
 Fig. 47
 Fig. 48
 Fig. 49
 Fig. 50
 Fig. 51
 Fig. 52
 Fig. 53
 Fig. 54
 Fig. 55
 Fig. 56
 Fig. 57
 Fig. 58
 Fig. 59
 Fig. 60
 Fig. 61
 Fig. 62
 Fig. 63
 Fig. 64
 Fig. 65
 Fig. 66
 Fig. 67
 Fig. 68
 Fig. 69
 Fig. 70
 Fig. 71
 Fig. 72
 Fig. 73
 Fig. 74
 Fig. 75
 Fig. 76
 Fig. 77
 Fig. 78
 Fig. 79
 Fig. 80
 Fig. 81
 Fig. 82
 Fig. 83
 Fig. 84
 Fig. 85
 Fig. 86
 Fig. 87
 Fig. 88
 Fig. 89
 Fig. 90
 Fig. 91
 Fig. 92
 Fig. 93
 Fig. 94
 Fig. 95
 Fig. 96
 Fig. 97
 Fig. 98
 Fig. 99
 Fig. 100

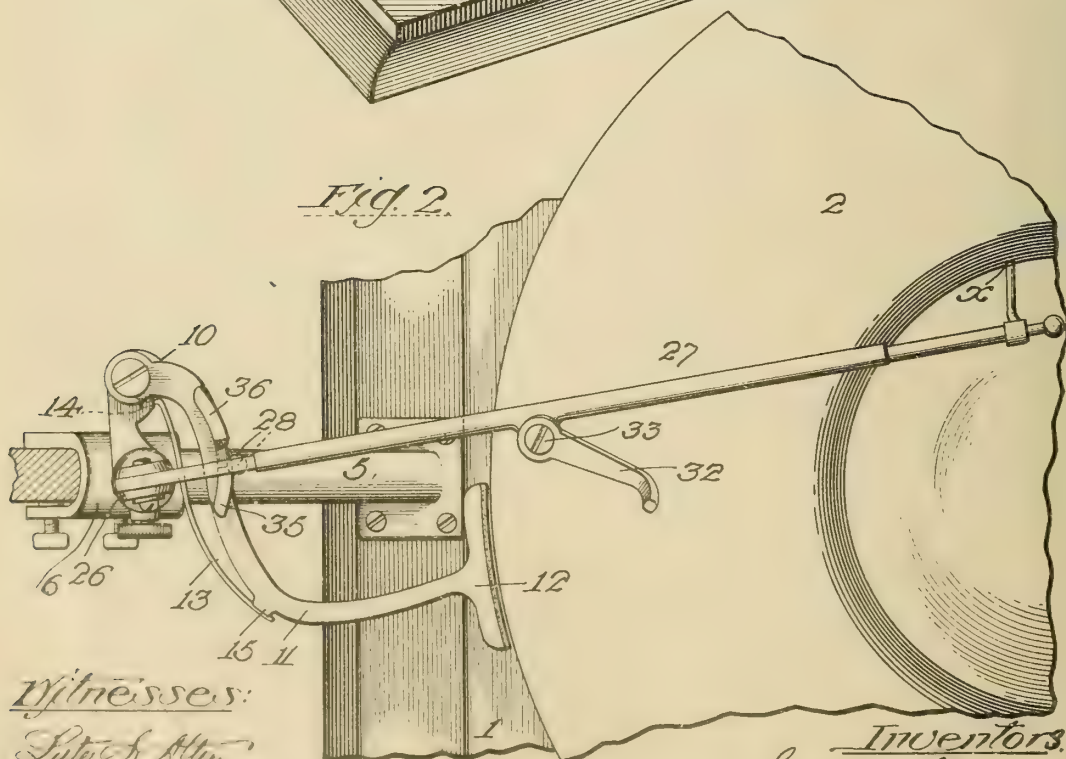
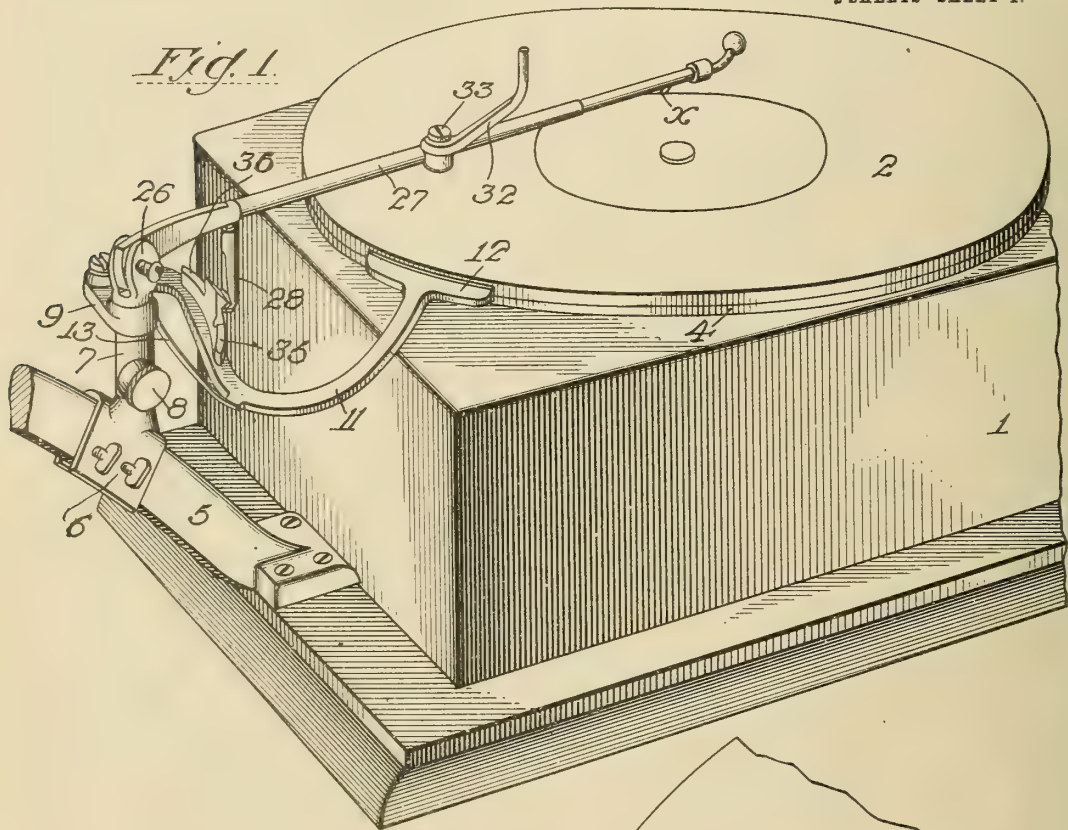
Fig. 1
 Fig. 2
 Fig. 3
 Fig. 4
 Fig. 5
 Fig. 6
 Fig. 7
 Fig. 8
 Fig. 9
 Fig. 10
 Fig. 11
 Fig. 12
 Fig. 13
 Fig. 14
 Fig. 15
 Fig. 16
 Fig. 17
 Fig. 18
 Fig. 19
 Fig. 20
 Fig. 21
 Fig. 22
 Fig. 23
 Fig. 24
 Fig. 25
 Fig. 26
 Fig. 27
 Fig. 28
 Fig. 29
 Fig. 30
 Fig. 31
 Fig. 32
 Fig. 33
 Fig. 34
 Fig. 35
 Fig. 36
 Fig. 37
 Fig. 38
 Fig. 39
 Fig. 40
 Fig. 41
 Fig. 42
 Fig. 43
 Fig. 44
 Fig. 45
 Fig. 46
 Fig. 47
 Fig. 48
 Fig. 49
 Fig. 50
 Fig. 51
 Fig. 52
 Fig. 53
 Fig. 54
 Fig. 55
 Fig. 56
 Fig. 57
 Fig. 58
 Fig. 59
 Fig. 60
 Fig. 61
 Fig. 62
 Fig. 63
 Fig. 64
 Fig. 65
 Fig. 66
 Fig. 67
 Fig. 68
 Fig. 69
 Fig. 70
 Fig. 71
 Fig. 72
 Fig. 73
 Fig. 74
 Fig. 75
 Fig. 76
 Fig. 77
 Fig. 78
 Fig. 79
 Fig. 80
 Fig. 81
 Fig. 82
 Fig. 83
 Fig. 84
 Fig. 85
 Fig. 86
 Fig. 87
 Fig. 88
 Fig. 89
 Fig. 90
 Fig. 91
 Fig. 92
 Fig. 93
 Fig. 94
 Fig. 95
 Fig. 96
 Fig. 97
 Fig. 98
 Fig. 99
 Fig. 100

G. BUELNA & A. E. BURSON.
 BRAKE MECHANISM FOR TALKING MACHINES.
 APPLICATION FILED DEC. 28, 1907.

930,038.

Patented Aug. 3, 1909.

2 SHEETS—SHEET 1.



Witnesses:

Lute S. Allen
A. H. Daehler

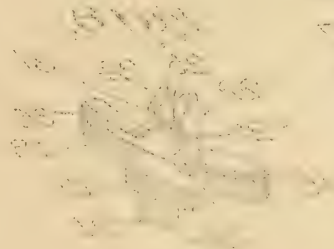
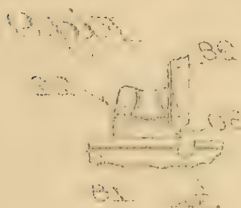
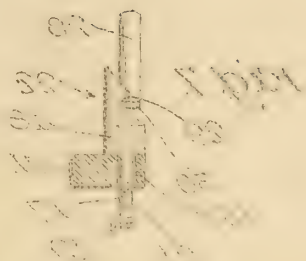
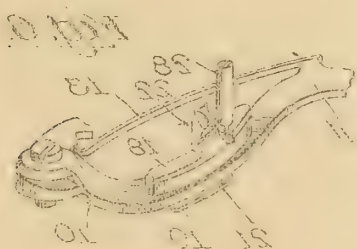
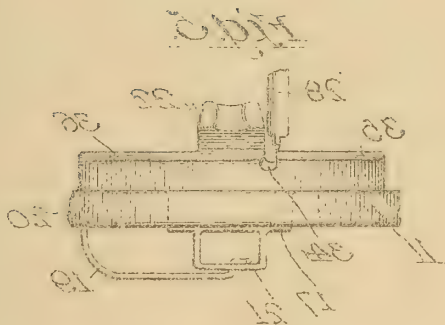
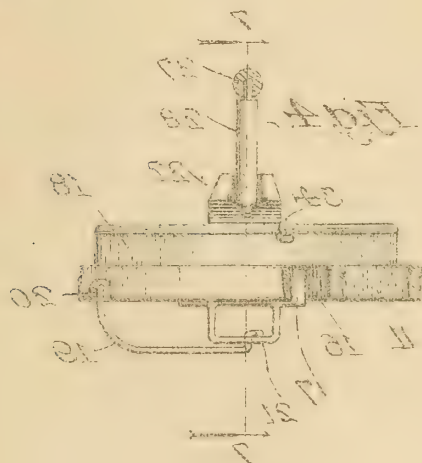
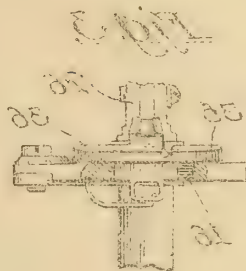
Inventors.

Guadalupe Buelna, and
Arthur Edward Burson,
by Anton Gustaf J. Reinhold

G. BOEHLA & A. E. BURSON.
 BRAKE MECHANISM FOR TAPPING MACHINES.
 APPLICATION FILED DEC. 28 1907.

Patented Aug. 2 1909.
 2,727,412

930,038.



Witness my hand and seal this 28th day of December, 1907.

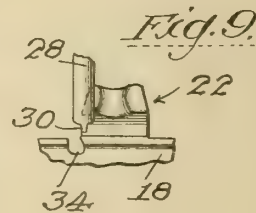
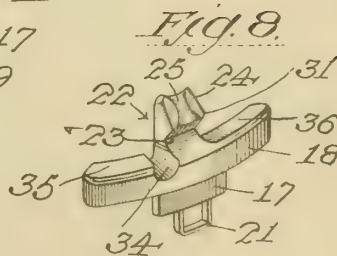
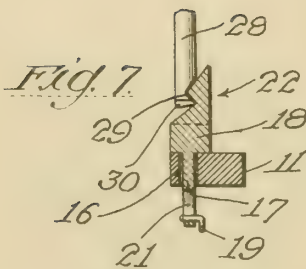
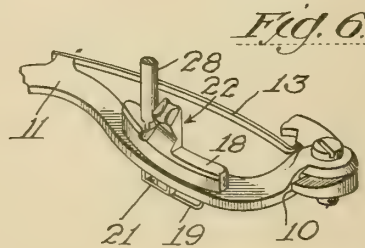
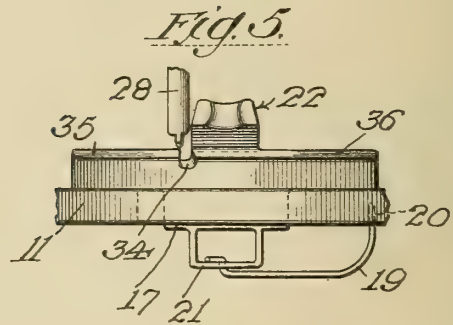
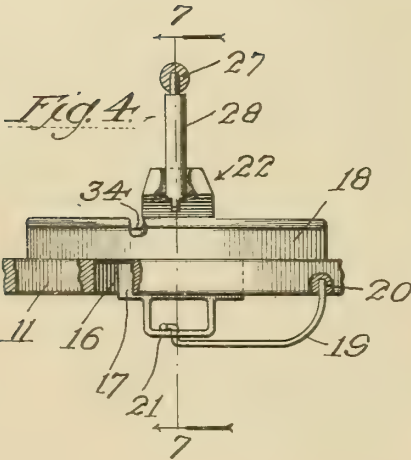
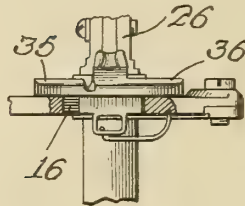
G. BOEHLA & A. E. BURSON.

G. BUELNA & A. E. BURSON.
BRAKE MECHANISM FOR TALKING MACHINES.
APPLICATION FILED DEC. 28, 1907.

930,038.

Patented Aug. 3, 1909.
2 SHEETS—SHEET 2.

Fig. 3



Witnesses:

W. H. Daeher.
A. H. Daeher.

Inventors:

Guadalupe Buena
and *Arthur Edward Burson*
by *Anton Gloetzer Jr.*
Att'y.

UNITED STATES PATENT OFFICE.

GUADALUPE BUELNA AND ARTHUR E. BURSON, OF SANTA BARBARA, CALIFORNIA.

BRAKE MECHANISM FOR TALKING-MACHINES.

No. 930,038.

Specification of Letters Patent.

Patented Aug. 3, 1909.

Application filed December 28, 1907. Serial No. 408,419.

To all whom it may concern:

Be it known that we, GUADALUPE BUELNA and ARTHUR EDWARD BURSON, citizens of the United States, residing at Santa Barbara, in the county of Santa Barbara and State of California, have invented certain new and useful Improvements in Brake Mechanism for Talking-Machines, of which the following is a specification.

10 This invention relates to brakes for talking machines, and has particular reference to braking mechanism for disk talking machines.

One of the objects of this invention is to provide an automatic braking mechanism for disk talking machines, which is actuatable by the movement of the sound box carrier arm instantaneously upon contact, thereby to avoid destruction of the stylus by continued rotation of the disk, and all possible damage liable to be occasioned by the stylus following the path of the waves on the inside of the record, which waves or indentations are usually rough and coarse.

25 Another object of this invention is to eliminate all mechanism hitherto employed for this purpose, for elevating the sound box immediately upon the completion of the reproduction of a record, and to cause the brake to act on the rotating disk carrier synchronously with the completion of the travel of the stylus in the sound waves of the disk.

35 The invention consists in the features, details of construction and combination of parts as will be described in connection with the accompanying drawings and then be more specifically pointed out in the claims.

40 In the drawings: Figure 1 is a perspective view of our invention applied to a talking machine. Fig. 2 is a fragmentary top plan view. Fig. 3 is a fragmentary detail showing the adjustable slide and spring for preventing same from slipping. Fig. 4 is a fragmentary detail partly in section showing the brake releasing stud in the guide preparatory to setting the same for actuation. Fig. 5 is a similar view showing the position of the brake releasing stud after actuation by the sound box carrier arm. Fig. 6 is a fragmentary perspective showing the brake actuating spring and the position of the brake releasing stud after the brake has been thrown. Fig. 7 is a fragmentary vertical section on lines 7-7 Fig. 4. Fig. 8 is a perspective detail of the adjustable slide and

Fig. 9 is a fragmentary detail showing the position of the brake releasing stud preparatory to releasing the brake.

Specific reference being had to the drawings, 1 designates the motor containing box of a disk talking machine.

2 is a disk record on the disk carrier 4.

5 is a supporting arm secured to the box 1. 6 is a furcation straddling said supporting arm 5 and having integral therewith a post, not shown, over which fits a sleeve 7 arranged to be fixed against movement thereon by a thumb screw 8. A shelf 9 is integrally united with said sleeve 7 and is provided with a shoulder 10. A brake arm 11 is pivotally mounted on said shelf 9, and is provided at the terminus thereof with a brake 12, extending in proximity to the disk carrier 4. Said brake arm 11 is arranged in a direct line with the shoulder 10 on the shelf against which it is designed to abut and limit the movement of the arm, which is normally under the tension of a flat spring 13, one end of which is housed in a socket 14 provided therefor in the shelf 9, and the other end of which engages a grooved projection 15 provided on the brake arm. The brake arm 11 is provided with a curved slot 16 into which is arranged to fit a guide plate 17 made integral with a slide 78 seated upon the brake arm 11. To insure frictional contact between the side 18 and the brake arm 11, we provide a spring 19, one end of which extends in a socket 20 provided in the brake arm, and the other end of which is seated in a stirrup 21 made integral with the guide plate 17. The tendency of the spring 19 is to exert a downward pressure on said slide and thereby prevent accidental slipping or looseness. The slide 18 is curved and provided centrally thereof with an upwardly extending member 22 having a V shaped groove 23. The top 24 of said member is at an angle to the vertical axis of the same and is provided with a groove 25. 26 is a yoke swiveled on said sleeve 7. 27 is a rod pivotally secured in said yoke 26. 28 is a stud carried by said rod and provided with a V shaped groove 29 and a lug 30 at the extremity thereof. Said stud 28 is in a direct line with the apex of the groove 25 and the depression of the rod 27 causes said stud to travel in said groove and said brake arm 11 to be moved against the tension of the spring 13. The continued depression of said rod brings the V shaped

groove 29 of the stud in engagement with the apex 31 of the V shaped groove 23 and of the incline of the top 24 of the member 22, as seen in Fig. 1.

5 On the rod 27 is a trip arm 32 capable of adjustment by set screw 33. This trip arm is arranged to be actuated by the swinging sound box carrier arm at the instant that the stylus has completed its travel in the sound waves of the disk record. On the end of the rod 27 is an indicating finger X for adjusting the brake accurately to regulate the immediate release of the brake at the proper moment.

15 To adjust the brake for operation upon the complete reproduction of a record, the rod 27 is raised to bring the stud 28 in line with the groove 25 of the member 22, and then lowered and depressed until the stud enters the groove 23. Thereupon the rod is shifted to the left or right until it clears the member 22. The stud being then in a position indicated by Fig. 6, the movement laterally of the rod will cause the slide to travel. When the indicating finger on the end of the rod registers with the innermost waves of the disk the lateral movement is stopped, and the rod again raised and depressed so that the stud repeats the same operation as before.

30 When the stud enters the groove 23 the rod is given a lateral movement to the left so that the edge of the stud is barely in contact with the edge of the member 22, as seen in Fig. 9. Consequently when the sound box carrier arm strikes against said trip arm 32 the stud is immediately thrown off the edge of the member and the brake applied. At the same time the lug 30 on the end of the stud enters the slot 34 in the slide which permits the brake arm 11 to act under the tension of the spring.

In case the brake device is not desired to be used the rod 27 may be thrown to one side or the other so that the stud 28 rests on the surfaces 35 or 36 of the slide, thereby to hold the rod out of contact with the surface of the disk, or the rod may be thrown entirely away from the machine, by the swivel connection.

What we claim is:

50 1. The combination with a disk talking machine and a swinging sound box carrier, of a support, a brake thereon, an adjusting means on said brake slidable relatively thereto to adjust the same to varying areas of sound waves, and a tripping member on said

support arranged to be actuated by the swinging sound box carrier.

2. The combination with a disk talking machine, and a swinging sound box carrier, of a support, a spring actuated brake thereon, an adjusting slide on said brake, means engaging said slide for holding said brake in inoperative position, and a combined tripping and adjusting member for actuating said brake, said member being operable by said sound box carrier.

3. The combination with a disk talking machine, and a swinging sound box carrier, of a support, a spring actuated brake on said support, an adjusting slide on said brake, a rod swiveled on said support, and a stud on said rod to engage said slide and hold said brake inoperative, said rod being operable by said swinging sound box carrier to cause said stud to clear said slide and release said brake.

4. The combination with a disk talking machine and a swinging sound box carrier, of a support, a spring actuated brake on said support, a slide on said brake, a rod swiveled on said support, means on said rod to engage said slide and hold said brake inoperative and an arm on said rod to be operated by said swinging sound box carrier to actuate said brake.

5. The combination with a disk talking machine and a swinging sound box carrier, of a support, a spring actuated brake on said support, a slide on said brake, a rod swiveled on said support, a stud on said rod to engage said slide and hold said brake inoperative and an adjustable arm on said rod to be operated by said swinging sound box carrier to actuate said brake.

6. In a sound-reproducing machine having a reproducer and needle or stylus, the combination, with a record-support, of means for stopping the rotation of the same at a predetermined point, said means being provided with a groove engaging finder for such predetermined point, and said means having a translatory or transverse movement across the record support.

In testimony whereof we affix our signatures in presence of two witnesses.

GUADALUPE BUELNA.
ARTHUR E. BURSON.

Witnesses:

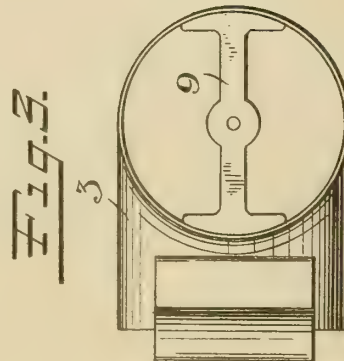
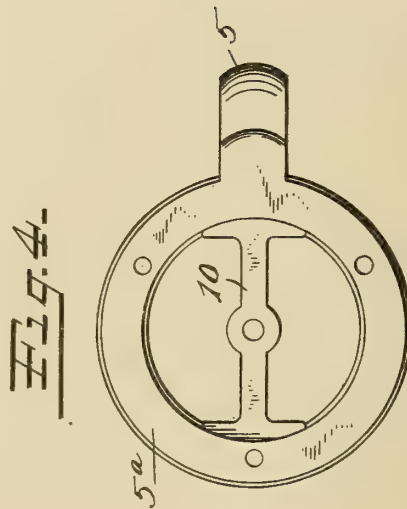
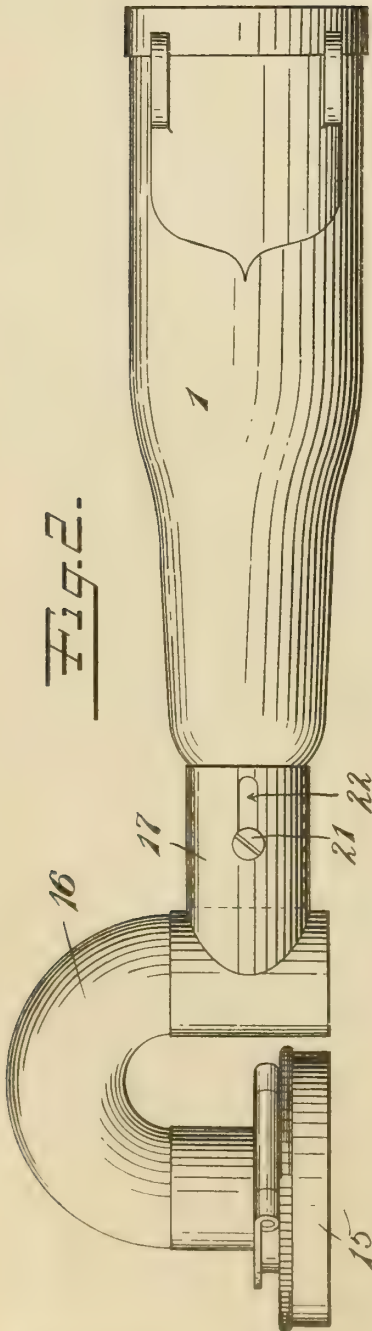
BERTHA BURSON.
J. H. BURSON.



A. KELLER.
TALKING MACHINE.
APPLICATION FILED NOV. 23, 1907.

930,294.

Patented Aug. 3, 1909.
2 SHEETS—SHEET 2.



Witnesses:
Charles E. ...
Langdon Morris

Inventor
ALFRED KELLER
By *his Attorneys*
Daniel Sprague & Co.



A. KELLER.
TALKING MACHINE.
APPLICATION FILED NOV. 23, 1907.

930,294.

Patented Aug. 3, 1909.
2 SHEETS—SHEET 1.

Fig. 1.

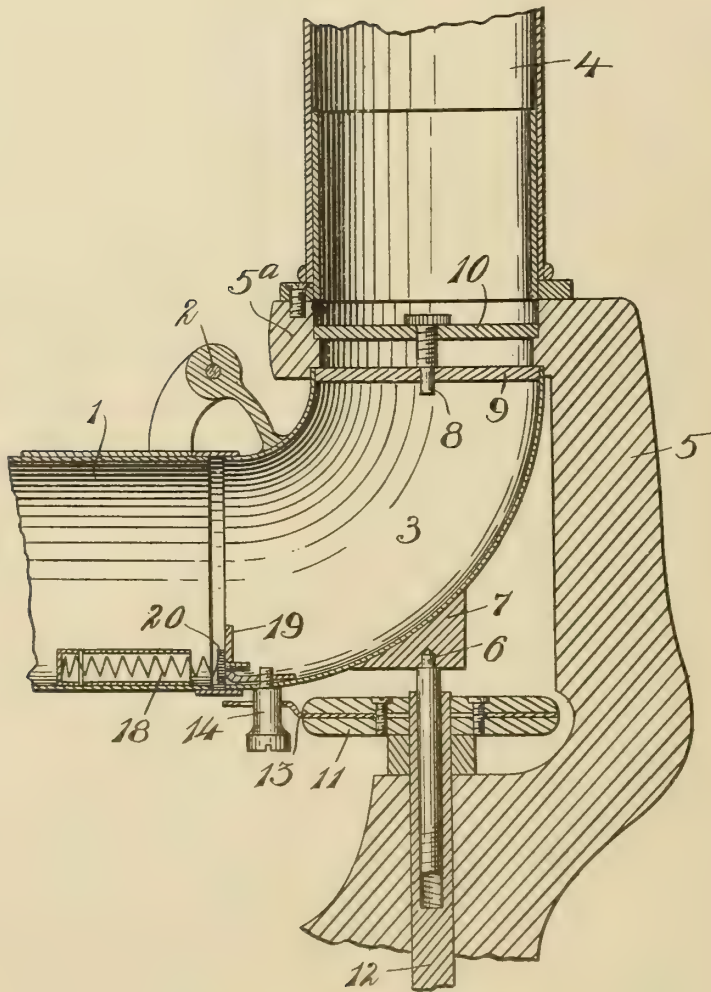
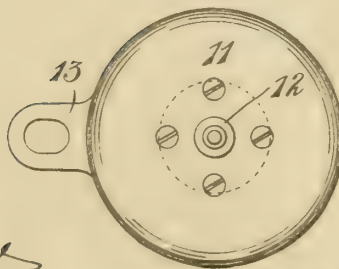


Fig. 5.



Witnesses
Chas. A. Reed
Langdon Moore

Inventor
ALFRED KELLER.
By *his Attorneys*
Paul & Thomas M. M. M.

UNITED STATES PATENT OFFICE.

ALFRED KELLER, OF STE. CROIX, SWITZERLAND, ASSIGNOR TO MERMOD FRÈRES, OF STE. CROIX, SWITZERLAND.

TALKING-MACHINE.

No. 930,294.

Specification of Letters Patent.

Patented Aug. 3, 1909.

Application filed November 23, 1907. Serial No. 403,435.

To all whom it may concern:

Be it known that I, ALFRED KELLER, a subject of the Emperor of Germany, residing at Ste. Croix, Canton of Vaud, Switzerland, have invented certain new and useful Improvements in Talking-Machines, of which the following is a full, clear, and exact description.

This invention relates to improvements in talking machines, and has particular reference to the producing and magnifying mechanism.

Certain features of construction, notably the clutch feeding mechanism, are from a broad standpoint disclosed in my prior application, Serial No. 395,945, and is broadly claimed therein.

In the accompanying drawings I have shown only such parts of an instrument as are necessary to a full understanding of the invention.

Figure 1 is a vertical section of a portion of the sound arm and support therefor; Fig. 2 is a plan view of the sound arm and sound box or reproducer; Fig. 3 is a plan view of certain features of construction; Fig. 4 is a plan view of certain other features of construction; Fig. 5 is a plan view of the friction clutch.

1 is the sound arm, the same being of bottle-shaped outline. This sound arm is hinged at 2 (Fig. 1) to the elbow 3, which forms a continuation thereof.

4 is an upward extension from the elbow 3 arranged to carry the usual horn or sound-magnifying device (not shown).

5 is a bracket carried by the case (not shown) of the talking machine, and which affords a support for the sound arm and extension, making suitable connection therewith, as by a collar 5^a.

In the construction shown, the upper part of the elbow 3 is mounted to rotate in the lower side of collar 5^a.

6 is a pivotal support for the lower end of the elbow 3, the same taking into a suitable bearing 7 thereon.

8 is an upper pivotal support, the same projecting into a skeleton frame or spider 9 fixed in the elbow 3. This pivotal support 8 is carried by a corresponding skeleton frame or spider 10 carried by collar 5^a.

11 is a clutch composing two plates carried by a driving shaft 12 driven from any suitable source of power (not shown), be-

tween which plates is a friction washer 13 having a slotted extension arranged to embrace a bearing 14 carried by the elbow 3. Obviously, as the shaft 12 rotates, it will, through the medium of the clutch 11 and friction washer 13, rotate the elbow 3 and thereby the sound arm 1.

At the free end of the sound arm 1 is a sound box 15 carried in any suitable manner, for example by means of a U-shaped tubular extension 16, which is slidable through an extension 17 on the sound arm 1.

18 is a buffer spring which is carried by one of the parts 1 or 3 and arranged to bear against the other part. In the particular form shown, this buffer spring 18 is carried by part 1 and is arranged to take up against an abutment 19 on the elbow 3 so as to carry part of the weight of the arm 1 and so as to check concussion when the arm descends. This spring tension 18 may be varied or may be adjusted by any suitable means, for example by means of a screw 20, such as shown in the drawings. The shaft 12 is driven in any suitable manner from the motor of the talking machine, such as described in my copending application, Serial No. 359,945, filed October 4, 1907, and always moves at a speed so proportioned thereto that the sound box 15 will be caused to traverse diametrically the record (not shown) at the proper speed to follow the spiral groove therein.

Inasmuch as some records vary from others in the width of the space between the grooves, it is desirable to have means to compensate for this variation, whereby the feeding mechanism will be adapted to the various grooves. This may be accomplished by shifting the extension 17 on the arm 1 toward or farther away from the axis of rotation of the elbow 3. When the desired adjustment is effected, the extension 17 may be locked on the arm 1 by means of the set-screw 21 moving in a slot 22 in extension 17.

The bottle-shaped sound arm is of great advantage in that it serves in a way the function of a sound-magnifying device intermediate the sound box 15 and the usual horn. By thus offering less resistance to the sound waves the record is reproduced much more satisfactorily. By making the arm bottle-shaped all angles are avoided, thereby offering less resistance to the sound waves.

As is well known, sound waves have a

tendency to expand as they proceed from their source. By providing this tapered sound arm 1 which increases gradually in diameter, from a point from close to the source of the sound waves, the latter are in a sense gradually released so that they may more readily adapt themselves to natural tendencies. In other words, by this arrangement less resistance is afforded to the sound waves and the danger of clashing is very largely avoided. In fact, by this arrangement the magnifying and development of the sound waves begins to occur almost immediately after said waves leave the sound box.

What I claim is:

1. In a talking machine, a sound conveying device comprising a sound arm, an elbow, a bracket pivotally connecting the sound arm with the top of the elbow, a driving shaft loosely pivoted to and supporting the bottom of the elbow, and an eccentric connection between said shaft and elbow.

2. In a talking machine, a sound conveying device comprising an elbow, a sound arm hinged thereto, a bracket pivotally supporting the top of the elbow, a shaft operatively connected with the driving mechanism and pivotally supporting the bottom of the elbow, and a connection between said shaft and elbow, including a friction disk.

3. In a talking machine, a sound conveying device including a sound box, a sound arm extending therefrom and increasing in diameter in a direction away from said box, and a loose pivotal support for the outer end of said sound arm and a friction driving clutch carried by said pivotal support and a connection between said sound arm and said clutch.

4. In a talking machine, a sound conveying device including a sound box, a sound

arm extending therefrom and increasing in diameter in a direction away from said box, a pivotal support for the outer end of said sound arm, and a frictionally driven means to swing said sound arm around the axis of its said support.

5. In a talking machine, a support for the sound producing mechanism, said sound producing mechanism including a sound box, a sound arm carrying said sound box, an elbow on said sound arm, a bearing for said elbow in said support, and a friction driving mechanism for said sound arm concentric with the bearing for said elbow.

6. In a talking machine, a support for the sound producing mechanism, said sound producing mechanism including a sound box, a sound arm carrying said sound box, an elbow on said sound arm, a bearing for said elbow in said support, and a driving mechanism for said sound arm concentric with the bearing for said elbow, said sound box being adjustable longitudinally on said sound arm, said driving mechanism including a friction clutch.

7. In a talking machine, a support for the sound producing mechanism, said sound producing mechanism including a sound box, a sound arm carrying said sound box and including a horizontally curved and hinged portion at its outer end, an elbow on said sound arm at its opposite end and having a horizontal hinge, a bearing for said elbow in said support, a friction driving clutch for said sound arm concentric with the bearing for said elbow.

ALFRED KELLER.

Witnesses:

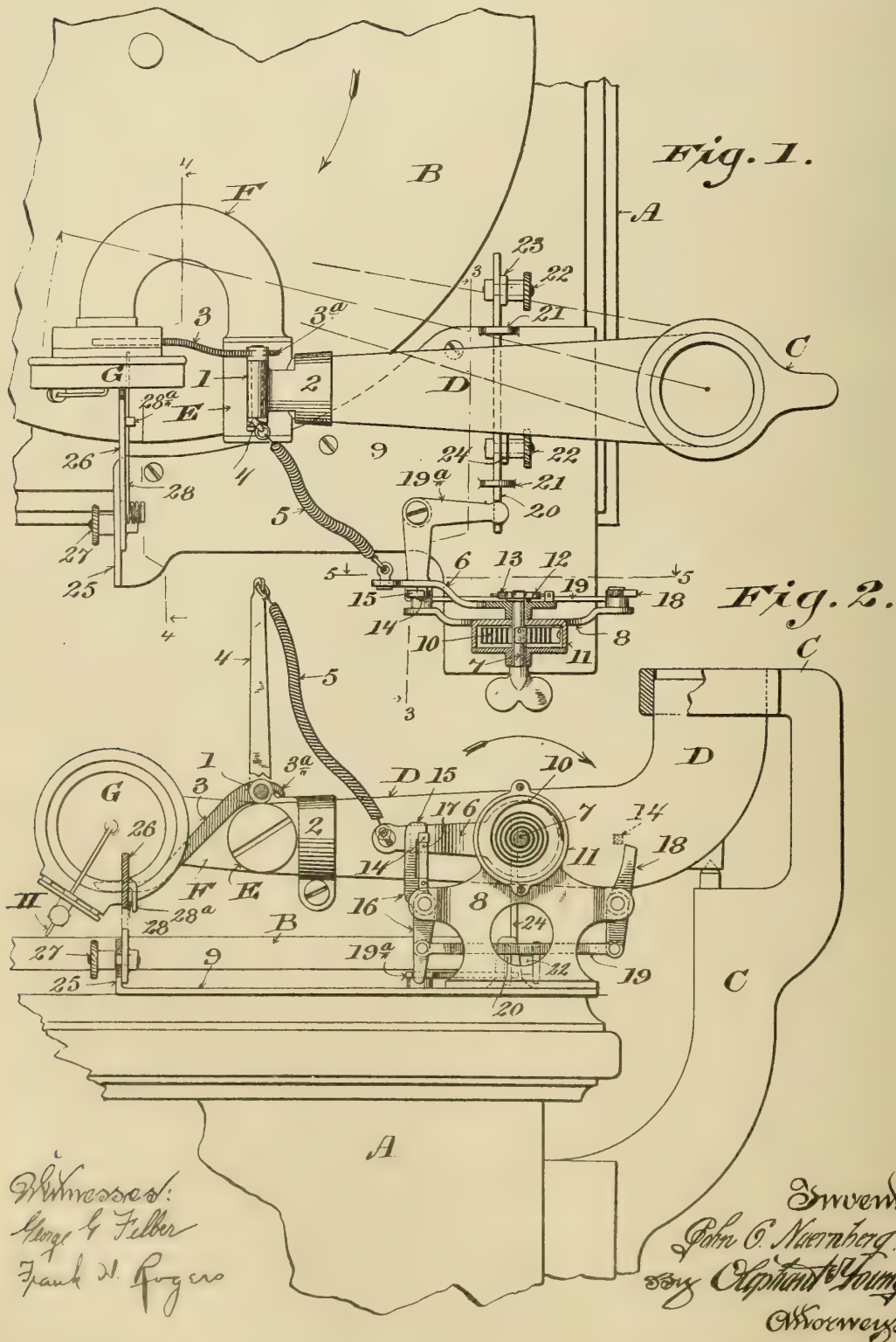
L. H. MUNIA.
F. VULLIN.



J. C. NUERNBERG
 PHONOGRAPH.
 APPLICATION FILED DEC. 30, 1908.

930,683.

Patented Aug. 10, 1909.
 2 SHEETS—SHEET 1.

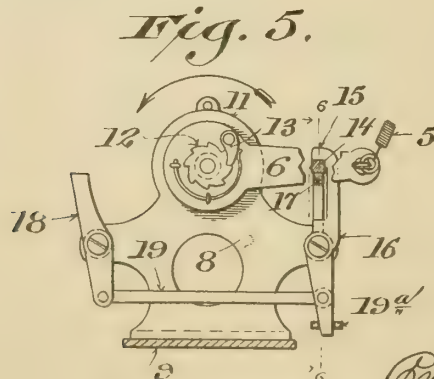
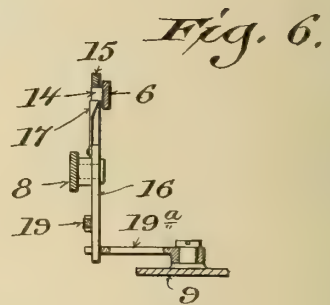
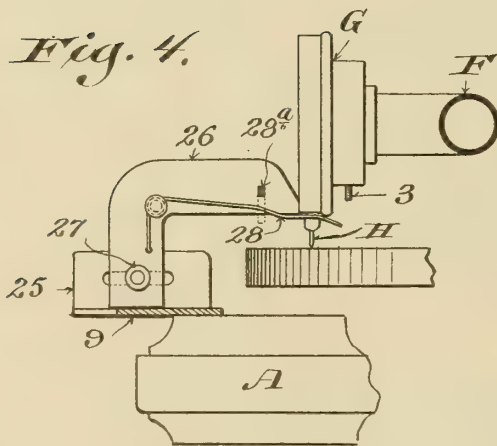
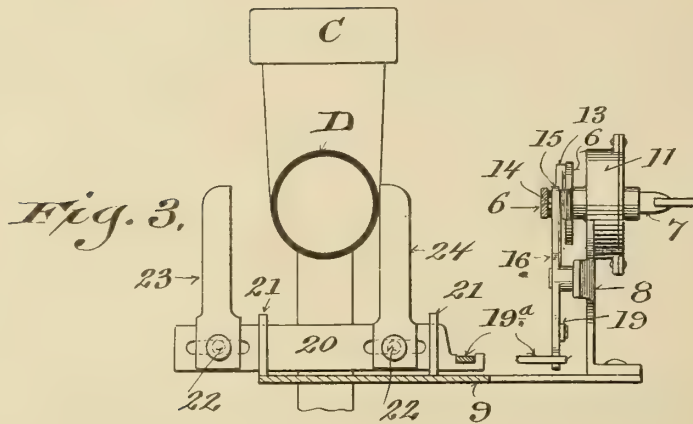


J. C. NUERNBERG.
 PHONOGRAPH.
 APPLICATION FILED DEC. 30, 1908.

930,683.

Patented Aug. 10, 1909.

2 SHEETS—SHEET 2.



Witnessed
 George L. Fisher
 Frank W. Rogers

Inventor
 John C. Nuernberg
 By Clifford Young
 Attorney

UNITED STATES PATENT OFFICE.

JOHN C. NUERNBERG, OF ATHENS, WISCONSIN, ASSIGNOR OF ONE-HALF TO CLAUDE F. HAMILTON, OF ATHENS, WISCONSIN.

PHONOGRAPH.

No. 930,683.

Specification of Letters Patent.

Patented Aug. 10, 1909.

Application filed December 30, 1908. Serial No. 470,075.

To all whom it may concern:

Be it known that I, JOHN C. NUERNBERG, a citizen of the United States, and resident of Athens, in the county of Marathon and State of Wisconsin, have invented certain new and useful Improvements in Phonographs; and I do hereby declare that the following is a full, clear, and exact description thereof.

The object of my invention is to provide a simple and effective repeating attachment for disk phonographs, its construction and arrangement being such that when the swinging-arm of a phonograph has completed its travel in the reproduction of a record, the said arm is lifted by the repeating device, returned to the starting point upon the record, and then gently lowered in such a manner that the pin is set upon the record without causing any damage to the same.

The invention therefore consists in various structural features and combination of parts as hereinafter set forth with reference to the accompanying drawings and subsequently claimed.

In the drawings: Figure 1 represents a plan view of a fragment of a disk phonograph having attached thereto a repeating device embodying the features of my invention, parts being broken away and parts in section to better illustrate the details; Fig. 2, an elevation of the same with parts broken away and other parts in section to more clearly show the structural details; Fig. 3, a detail sectional view of the apparatus, the section being indicated by line 3—3 of Fig. 1; Fig. 4, a detail cross-section of the apparatus, as indicated by line 4—4 of Fig. 1; Fig. 5, a detail sectional view as indicated by line 5—5, showing an elevation of the repeater, motor and connected mechanism, and Fig. 6, a detail sectional view, as indicated by line 6—6 of the preceding figure.

Referring by characters to the drawings, A indicates a phonograph box, B a record disk mounted thereon and C a hanger which is secured to the box, into which hanger is pivotally mounted the usual horizontal swinging hollow arm D. This arm terminates with a cross sleeve E, into which is oscillatively fitted a U-shaped tube F, the outer free end of the tube being provided with a diaphragm head G carrying the vibratory pin H. All of the above described

mechanism is of any standard construction and forms no part of my invention, it being understood that the U-shaped tube is capable of independent vertical motion relative to the horizontal swing of the arm D, whereby compensation is provided when the pin H is performing its function.

A bearing sleeve 1 provided with an extending clip 2 is secured to the arm D at the junction of its sleeve-portion E. Fulcrumed in the bearing sleeve 1 is a controlling lever having a depending arm 3 that extends under the diaphragm head G and an upwardly projecting arm 4, which latter arm is connected by a flexible coil-spring 5 to a motor-controlled crank 6 that is intermittently rotated. A stop-lug 3^a extends from the lever-arm 3 and is adapted to contact with the sleeve portion E of the swing-arm D, the lug being provided to control the limit of movement of the lever in one direction. The crank is loosely mounted upon a power-shaft 7, which shaft is revoluble in bearings of a frame 8 secured to a base-plate 9, the base-plate being in turn fast to the top of the phonograph box. One end of a clock-spring 10 constituting a motor, is secured to the power-shaft 7, the opposite end of the clock-spring being fast to a housing 11, forming part of the frame 8, and through which housing one end of the power-shaft extends and is provided with a winding-key, as shown. The opposite end of the power-shaft has secured thereto a ratchet-wheel 12, which is engaged by a spring-controlled pawl 13 carried by the crank 6, whereby said crank is rotated in one direction, while the pawl and ratchet-wheel connected to the power-shaft constitute a clutch to permit winding of the clock-spring without disturbing the aforesaid crank. The crank 6 is arranged to be rotated by the clock-spring in the direction as indicated by the arrows in Figs. 2 and 5, and as shown in these figures, when said crank is in its normal position it is held by a lug 14, which lug engages the underside of a notched head 15 of a rock-arm 16, the latter being fulcrumed upon the frame 8. For the purpose of preventing movement of the crank 6 during the winding operation of the clock-spring 10, the crank-lug 14 is locked against the underside of the notched head 15, by means of a wedge-shaped block 17, which block forms part of a leaf spring that is secured to said rocker arm. The

tapered face of the block 17 is presented toward the end of the lug 14 and is disposed at a right-angle to the fulcrum of the rocker-arm. By this arrangement it will be seen
 5 that as the crank lug is brought to its seat under the rocker-arm head, the end of the lug will engage the leaf-spring and force the same backward to thereby permit said lug 14 to seat, at which time said leaf-spring
 10 snaps forward and effects the locking.

Pivoted to the frame 8, opposite the rock-arm 16, is another rock-arm 18, the two being connected by a link 19, whereby they are actuated in unison and constitute in connection with the crank stops for the motor. The
 15 upper end of the rock-arm 18 is also arranged to be engaged by the lug 14 of the crank, whereby the latter is checked when released by the rock-arm 16, thus the motive
 20 force in connection with said crank is checked at each half revolution. The lower end of the rock-arm 16 is engaged by one arm of a bell-crank 19^a, which bell-crank is pivoted upon the base-plate 9, the opposite
 25 arm of said bell-crank being nested within a notched recess of a slide-bar 20, as clearly illustrated in Figs. 1 and 3 of the drawings. The slide-bar 20 is guided in ears 21 extending from the base-plate and is slotted to receive
 30 thumb-screws 22, which screws serve as retainers for a pair of adjustable tappets 23, 24, that are arranged to project upward upon opposite sides of the swinging arm D of the plunger, and together with the slide-bar
 35 bar and bell-crank constitute release-mechanism for the rock-arms or motor stops. As best shown in Figs. 1 and 4 of the drawings, the base-plate 9 is provided with a slotted flange 25 approximately alined with the diaphragm head G. This flange carries an adjustable
 40 finger 26 which is secured to the flange by means of a thumb-screw 27 that passes through the slot in said flange and also through an aperture in the base-portion
 45 of the finger. The end of the finger projects slightly over the upper face of the record-disk and beyond said finger end is extended the tail of a spring-rod 28 having its end turned downward. The spring-rod is fastened
 50 to the base-portion of the finger and is normally under a slight tension, due to its engagement with the throat of a guide-lug 28^a, which extends from the finger and serves to hold the spring against horizontal play.
 55 The finger 26 constitutes a stop against which the diaphragm head contacts when returned to its starting-point, its adjustable feature being provided in order that said diaphragm head may be accurately checked
 60 so to bring the pin H thereof in register with the circumferential starting-point upon the record-disk. The delicate spring-rod 28 in this case extends under the aforesaid diaphragm head, and as the same drops,
 65 by gravity, this spring-rod receives and ab-

sorbs all shock in order that the pin H may be gently seated upon the record-disk and thus prevent the same from being injured.

It should be understood that the weight of the vertically swinging diaphragm-head
 70 and connected parts, relative to the tension of the spring-rod, is such that said tension will not interfere with a perfect contact between the pin H and record-disk, and when the diaphragm-head leaves the spring-rod
 75 there will be no appreciable change in the tone of the instrument, this effect being due to the inclined end of said spring-rod, which permits a gradual release of said diaphragm-head from the former.
 80

In adjusting the repeater device, the tappets 23, 24, are set so that the tappet 24 will be actuated by the swing-arm D, upon the return of the same to its starting position. The tappet 23 is likewise set with relation
 85 to the swing of the arm, so that when said arm has reached the point upon the disk where the record is concluded the aforesaid arm will actuate this last named tappet.

As shown in the drawings, all views illustrate the parts in their starting position, in which position the coil-spring 5 is more or less slack, due to the crank 6 and lever-arm 4 being at their shortest position apart. Now should the instrument be put in motion
 95 a reproduction of the record will be instantly started, the swinging-arm D being gradually moved in an arch toward the center of the disk until such time as it strikes tappet 23. A slight movement of the tappet,
 100 together with the slide-bar 20, then causes a movement of the bell-crank 19^a, which in turn actuates the rocker-arms 16 and 18. This movement frees the lug of crank 6 from its seat under the head of the rocker-arm
 105 16 and releases the motive power, which power causes said rocker-arm to make one-half of a revolution, when it is stopped by the end of rocker-arm 18 having been moved into the path of travel of the lug 14 simultaneously with the movement of rocker-arm
 110 16, due to the link-connection between the latter and rock-arm 18. Upon the initial movement of the released crank its coil-spring connected to lever-arm 4, causes the
 115 same together with its arm 3 to rock in the sleeved bearing, the coil-spring 5 prior to this time having been drawn taut. In consequence of this movement, it will be understood that the diaphragm-head together
 120 with pin H is immediately lifted by lever-arm 3 a slight distance, which distance is limited by the stop-lug 3^a of said arm coming in contact with the sleeve E of the swing-arm. The pin H is now clear of the disk
 125 record and as the crank 6 completes its half revolution under the power of the motor, the swing-arm D is quickly moved over to its starting position. Thus the crank-arm 6
 130 in describing its first half revolution lifts

the diaphragm-head and draws the swinging-arm D back to its starting-point. The crank-arm now rests upon the top of rocker-arm 18 and the coil-spring 5 is taut. Owing to the fact that the crank-arm, when making its first revolution, travels faster than the swinging-arm D, said crank-arm consequently distends the coil-spring 5 and hence the latter spring, in contracting, causes the swinging-arm D to be moved over to its starting-point, the interval of time in which this movement takes place being the period when the crank-arm is resting upon the rocker-arm 18. At the instant of impact between the diaphragm-head and the finger 26, upon the return movement of the swinging-arm D, the latter actuates tappet 24, which action through the slide-bar and bell-crank causes the rock-arms to assume their normal or starting position, as shown in the drawings. This rock-arm 18 is thus swung free of the lug 14 of the crank-arm, which arm had momentarily rested thereon and the latter is thereby returned by the motor to its starting-point having now made a complete revolution in one direction. The crank-arm after being returned to its normal or starting position is again caught under the head of rock-arm 16, whereby slack of the coil-spring 5 is established and the diaphragm head will assume such a position as will enable the pin H to effect a repeat operation of the record, by engaging the first circumferential groove in the disk.

Thus it will be seen that the essential features of the repeater mechanism consist primarily in a motor having a flexible connection with the swinging-arm of a phonograph and intermittent stop and start mechanism for the motor under control of said swinging arm.

While I have shown and described the motor-spring as being connected directly to the power-shaft, it is apparent that there may, in some instances, be interposed any suitable clock-gear trains between the spring and power-shaft, whereby frequent winding of said spring will be avoided.

I claim:

1. In a disk phonograph provided with a swinging-arm, a repeating mechanism comprising a motor, a crank in connection with the motor, a pair of stops for the crank, release tappets disposed upon opposite sides of the swinging-arm in connection with the stops, and a flexible connection between the crank and swinging-arm.

2. In a disk phonograph provided with a swinging-arm, a repeating-mechanism comprising an independent motor, a flexible connection between the swinging-arm and motor, and a start-and-stop mechanism for the motor controlled by said swinging-arm.

3. In a disk phonograph provided with a horizontally swinging-arm, and having a vertically swinging head section in connection with the arm, a repeating-mechanism comprising a controlling-lever for the head section carried by the arm, a stop for said arm adapted to engage said head section, a motor, a flexible connection between the motor and controlling-lever, stop-and-start mechanism for said motor, and tappet mechanism disposed in the path of travel of the swinging-arm in connection with the stop-and-start mechanism.

4. In a disk phonograph provided with a horizontally swinging-arm, and having a vertically swinging head section in connection with the arm, a repeating-mechanism comprising a controlling-lever for the head-section carried by the arm, a yielding stop for said arm adapted to engage said head-section, a motor actuating crank, a flexible connection between the crank and controlling-lever, stops disposed in the path of travel of the crank, tappets upon opposite sides of the swinging-arm, and releasing means for the stops in connection with the tappets.

5. In a disk phonograph provided with a horizontally swinging-arm, and having a vertically swinging head-section in connection with the arm, a repeating-mechanism comprising a controlling lever in pivotal connection with said arm, one arm of which lever extends under the head-section, a stop for the controlling-lever, an adjustable yielding stop for the head section of the aforesaid arm, a motor actuating crank, a flexible connection between the crank and controlling lever, stops disposed in the path of travel of the crank, tappets upon opposite sides of the swinging-arm, and adjustable releasing means for the stops in connection with the tappets.

In testimony that I claim the foregoing I have hereunto set my hand at Athens, in the county of Marathon and State of Wisconsin in the presence of two witnesses.

JOHN C. NUERNBERG.

Witnesses:

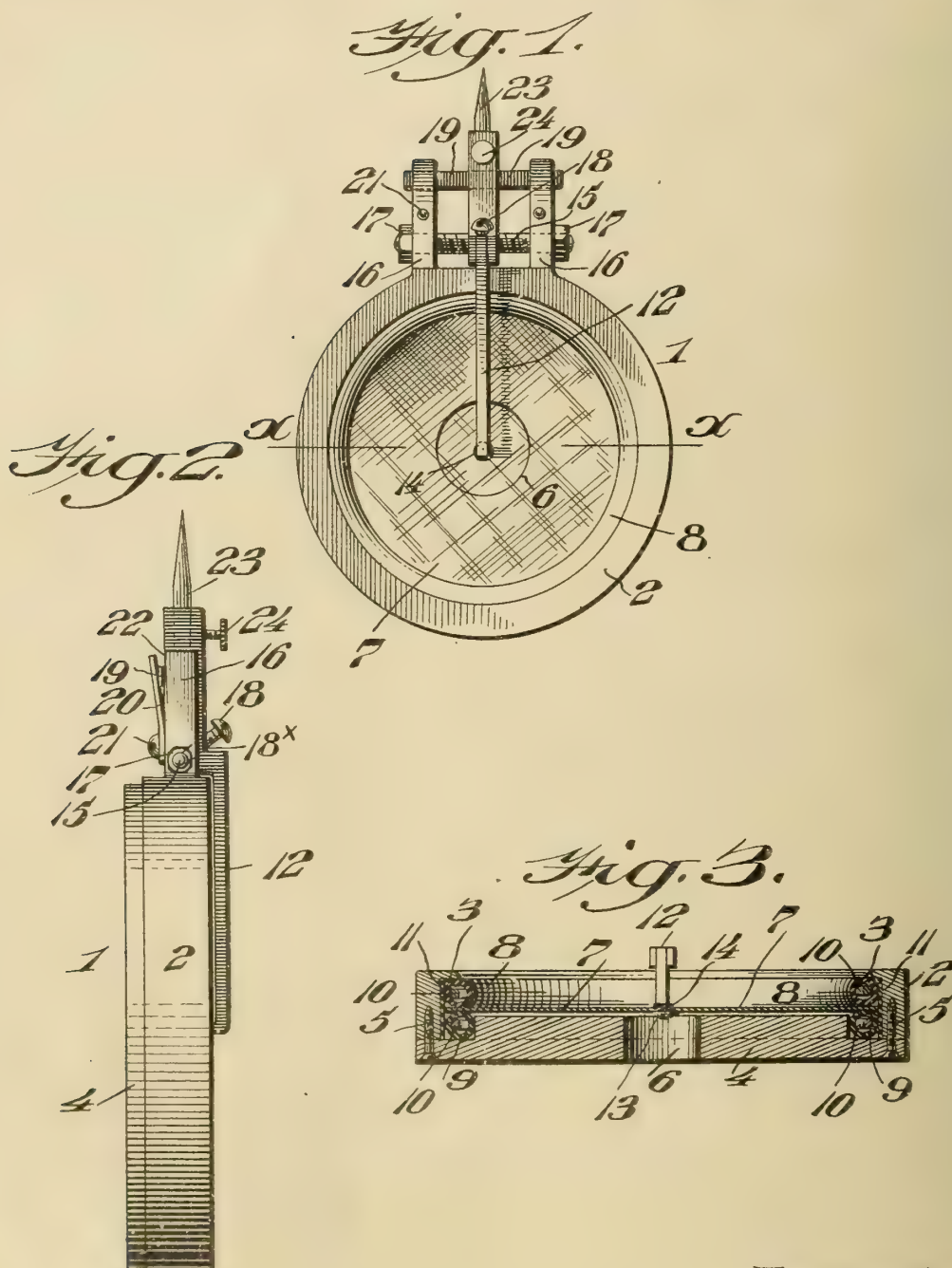
FRANK F. CHESAK,
C. F. HAMILTON.



W. W. ZACKEY.
SOUND BOX FOR RECORDING AND REPRODUCING MACHINES.
APPLICATION FILED MAR. 3, 1909.

930,715.

Patented Aug. 10, 1909.



Witnesses
H. Richter
L. Douville.

Inventor
William W. Zackey.
By Weidersheim & Haibanks.
Attorneys

UNITED STATES PATENT OFFICE.

WILLIAM W. ZACKEY, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR OF FORTY-NINE ONE-HUNDREDTHS TO CHARLES B. HEWITT, OF BURLINGTON, NEW JERSEY.

SOUND-BOX FOR RECORDING AND REPRODUCING MACHINES.

No. 930,715.

Specification of Letters Patent.

Patented Aug. 10, 1909.

Application filed March 3, 1909. Serial No. 481,002.

To all whom it may concern:

Be it known that I, WILLIAM W. ZACKEY, a citizen of the United States, residing in the city and county of Philadelphia, State of Pennsylvania, have invented a new and useful Sound-Box for Recording and Reproducing Machines, of which the following is a specification.

This invention relates to sound recording and reproducing machines and more particularly to that portion of sound recording and reproducing machines known as the sound box.

In sound boxes for recording and reproducing machines, as heretofore constructed, the regulation and control of the vibrating member or diaphragm has not been such as to insure the production of the clearest, purest tones and the reproduction of perfect articulation and the like, while at the same time maintaining a desirable volume of sound. Even a near approach to a pure tone has only been accomplished by sacrificing sound volume and vice versa.

In my present invention I have devised a novel stylus supporting means and diaphragm securing devices whereby tone volume and tone quality have a direct relation one to the other and in which the stylus and its adjuncts may be manipulated as desired for a minimum or maximum volume while the tone quality is appreciably affected.

It further consists of other novel features of construction, all as will be hereinafter fully set forth.

For the purpose of illustrating my invention, I have shown in the accompanying drawings one form thereof which is at present preferred by me, since the same has been found in practice to give satisfactory and reliable results, although it is to be understood that the various instrumentalities of which my invention consists can be variously arranged and organized and that my invention is not limited to the precise arrangement and organization of these instrumentalities as herein shown and described.

Figure 1 represents a front elevation of a sound box embodying my invention. Fig. 2 represents a side elevation of the same. Fig. 3 represents a section on line $x-x$, Fig. 1.

Similar numerals of reference indicate corresponding parts in the figures.

Referring to the drawings:—1 designates the sound box of a sound recording and reproducing machine preferably of ordinary shape and size and in the present instance consisting of an annular ring 2, provided with an overhanging rim 3 whereby a shouldered recess is formed, adapted to receive the adjuncts of the sound box.

Coöperating with the ring 2 is a cap 4, secured thereto by screws 5 or equivalent devices, and provided with an aperture 6 preferably at the center thereof in order to conduct sound vibrations as transmitted. These sound vibrations are received upon a diaphragm 7 suitably mounted within the box out of contact with the material of the box and in the present instance being secured by tubes 8 and 9 of rubber or like yielding material which are respectively located on opposite sides of the diaphragm 7. In order to maintain these tubes fixedly in position, I preferably employ a spring wire 10, interiorly disposed in each tube and of small relative diameter so that sufficient space is provided to permit free yielding of the tube under a vibratory movement. It is well known that the quality of the sound produced depends largely upon the mounting of this diaphragm and its being free from contact with metallic or other hard surfaces which tend to produce a grating or undesirable sound. As here shown, I employ a strip of cork 11 within the annular ring 2 and in a position to prevent contact of the diaphragm 7 with the ring 2, though, of course, any material having similar characteristics may be used.

12 designates a stylus bar of usual construction, which, in the present instance, I secure to the diaphragm 7 by a screw 13 between which and the diaphragm 7 itself, in the present instance, I employ a lushing 14 of yielding material in order that the metallic portions may not come into direct contact with the said diaphragm. The stylus bar 12, as herein disclosed, is provided with a threaded aperture for pivotal movement upon a threaded spindle 15 which latter is suitably secured in ears 16 connected in any suitable manner to the box 1. Suitable nuts 17 may be employed to prevent movement of the spindle 15 during the oscillating of the stylus bar 12. Special attention is directed

to the mounting of the stylus bar 12 upon the screw threaded spindle 15, since thereby a firm bearing is provided, free from undesirable lost motion and incident metallic vibrations and a clear full perfect tone may be produced.

18 designates a set screw passing through a suitable threaded aperture 18^x in the stylus bar 12 into contact with the spindle 15 whereby an adjustment is provided, which makes it possible to regulate and control the oscillation of the stylus bar. That is to say, if it is desired to reproduce the full vibratory effect of the diaphragm 7 resulting in the maximum of the sound, the set screw 18 is adjusted to have no bearing whatsoever upon the spindle 15. If, however, it is desired to tone down the sound and reduce the loud effect, the set screw is tightened somewhat upon the spindle 15 thereby limiting more or less the oscillation of the stylus bar 12. Of course it will be understood that some means are necessary to make a complete vibration of the diaphragm 7 possible, that is to return it to normal position after a sound wave has been transmitted thereto and for this purpose I preferably provide a flexible spring 19, suitably mounted on the ears 16 and in a position to be placed under stress when a sound wave is received and react to return the stylus bar to normal position at the end of the sound wave. In the present instance, this spring 19 is held in place by clips 20 adjustably mounted on the ears 16 by screws 21 or equivalent devices, whereby it is possible, by loosening the said set screws, to change the position of the spring 19 and move the same over nearer to the spindle 15 thereby diminishing the leverage or moving it farther away increasing the leverage as the case may be. It will be understood, for perfect working of the sound box, that the diaphragm 7 should always normally be in neutral position and in order that the spring 19 may have no tendency to deflect the diaphragm from such position, each ear 16 is provided with a slight taper 22 to allow for the thickness of the spring.

23 designates the usual reproducing needle, the same being secured in any well known detachable manner to the stylus bar 12, as here shown, it is secured by a set screw 24.

Attention is directed to the securing means for the diaphragm 7, since by my novel fastening interiorly of the tubes 8 and 9 the life and cushioning effect thereof is prolonged indefinitely and the tubes do not become hard and non-resilient as when cemented or fastened by similar means.

It will be readily seen that the variable leverage obtained by the movable spring 19 is a very desirable feature as thereby an absolute control over the vibrating diaphragm is obtained so that the quantity of sound may

be regulated to a nicety. This feature combined with the adjustability of the stylus bar screw 18 renders it absolutely possible to control the tone quality and sound quantity to obtain the perfect result.

It will now be apparent that I have devised a complete unitary structure capable of producing in a sound recording and reproducing machine a tone rich in quality and variable as to quantity with the entire elimination of metallic, grinding or scratchy sounds so common in instruments of this class.

In so far as I am aware, I am the first in the art to provide a single stylus bar support performing the function of a pivot for correctly permitting oscillating movement of the stylus bar in such a manner as to eliminate all sounds tending to detract from the natural, full, clear tone.

I am aware that sound boxes have been variously devised and arranged in attempts to overcome defects of tone and the like and that it is well known practice to provide a number of knife-edge pivots for the stylus bar, but these, owing to the large wearing surface, soon develop lost motion and render the sound box practically useless and by my invention I have overcome all of such defects.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:—

1. In a sound recording and reproducing machine, a sound box, a diaphragm therein, a threaded spindle mounted on said sound box, a stylus bar secured to said diaphragm having a threaded opening therein for cooperation with said spindle, and adjusting means for regulating movement of said stylus bar.

2. In a sound recording and reproducing machine, a sound box having a diaphragm therein, a spindle mounted on said sound box, a stylus bar pivotally mounted on said spindle and secured at one end to said diaphragm, a spring mounted on said sound box for engagement with the free end of said stylus bar, and means for varying the point of engagement of the spring with the stylus arm.

3. In a sound recording and reproducing machine, a sound box having a diaphragm therein, a threaded spindle mounted on said sound box, a stylus bar carried by said spindle and secured at one end to said diaphragm, a spring mounted on said sound box for engagement with the free end of said stylus bar, and means for varying the point of engagement of the spring with the stylus arm.

4. In a sound recording and reproducing machine, a sound box having a diaphragm therein, a spindle mounted on said sound box, a stylus bar pivotally mounted on said spindle and secured at one end to said dia-

phragm, a spring mounted on said sound box for engagement with the free end of said stylus bar, means for varying the point of engagement of the spring with the stylus arm and means to regulate the movement of said stylus bar.

5 5. In a sound recording and reproducing machine, a sound box having a diaphragm therein, a spindle mounted on said sound box, a stylus bar pivotally mounted on said spindle and secured at one end to said diaphragm, ears extending from said sound box on opposite sides of said stylus bar, and a spring adjustably secured to said stylus bar and said ears.

10 6. In a sound recording and reproducing machine, a sound box, a diaphragm therein, sound deadening material encircling said diaphragm, a tube on each side of said dia-

phragm and means in each tube to maintain the same in operative position. 20

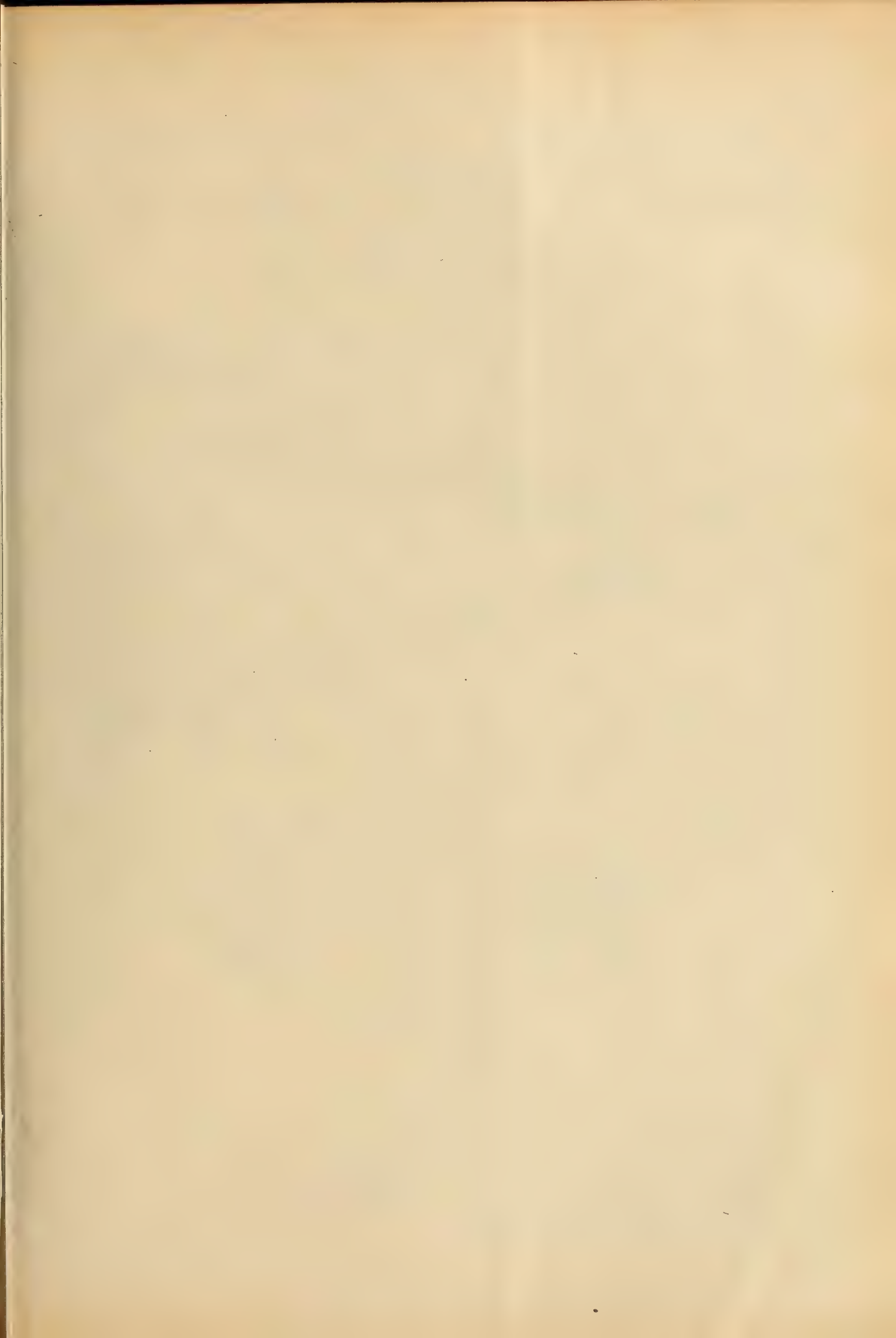
7. In a sound recording and reproducing machine, a sound box comprising an annular ring, having a shouldered recess therein, a diaphragm in said recess, a tube on each side of said diaphragm, a cap secured to said annular ring and means interior of each tube to maintain said tubes in contact with the walls of said recess. 25

8. In a sound recording and reproducing machine, a sound box, a diaphragm therein, a tube on each side of said diaphragm, and means in each tube to maintain the same in operative position. 30

WILLIAM W. ZACKEY.

Witnesses:

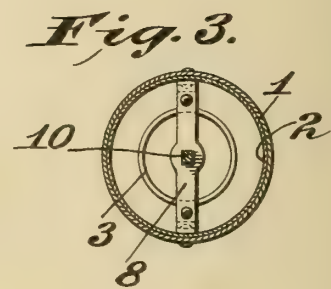
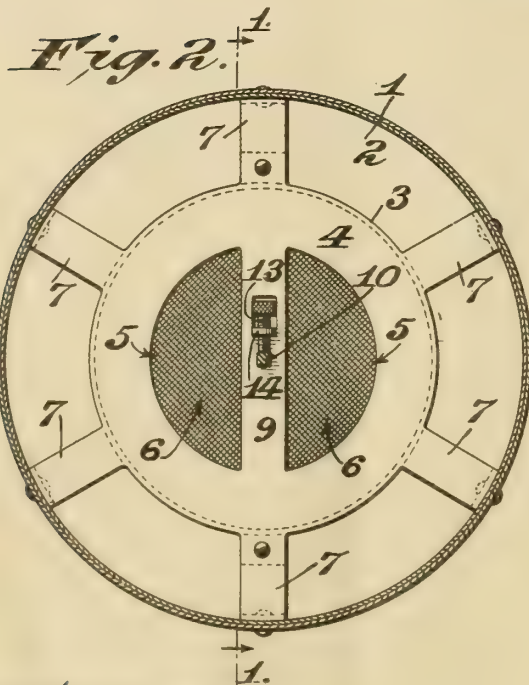
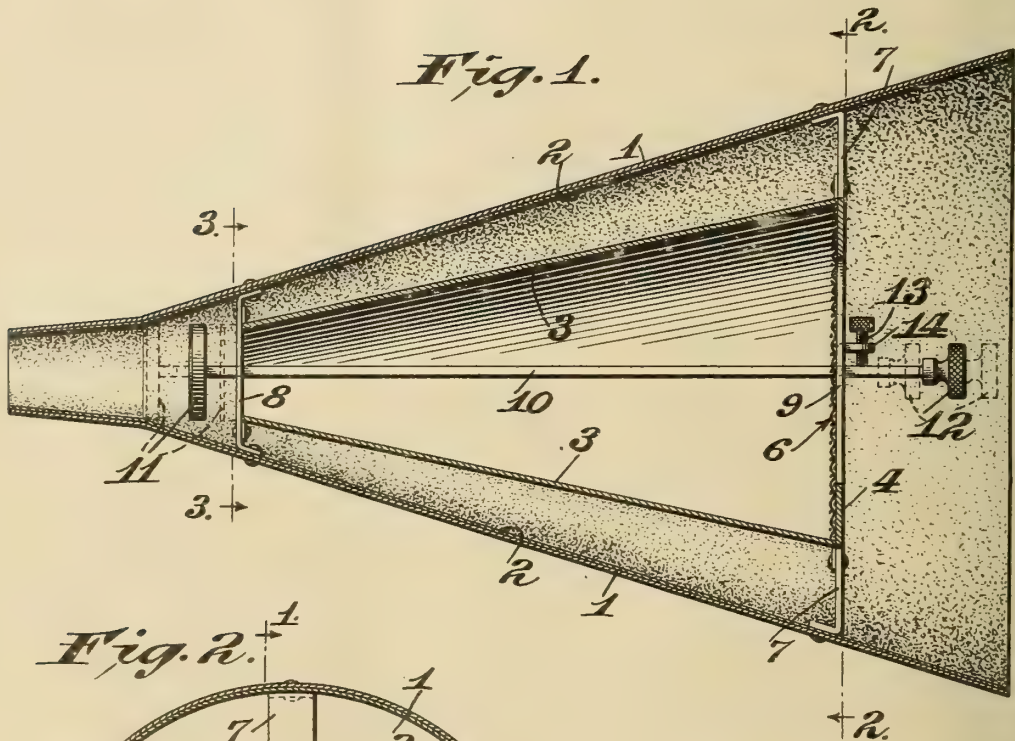
CHAS. B. HEWITT,
C. D. McVAY.



W. TATELBAUM.
AMPLIFYING HORN.
APPLICATION FILED JUNE 8, 1908.

931,161.

Patented Aug. 17, 1909.



Witnesses:
G. A. Pennington
Edgar L. Jacobs.

Inventor:
William Tattelbaum
By Ralph Talish
Atty.

UNITED STATES PATENT OFFICE.

WILLIAM TATELBAUM, OF ST. LOUIS, MISSOURI, ASSIGNOR OF ONE-THIRD TO SIGOLOFF BROS. HARDWARE COMPANY, OF ST. LOUIS, MISSOURI, A PARTNERSHIP.

AMPLIFYING-HORN.

No. 931,161.

Specification of Letters Patent.

Patented Aug. 17, 1909.

Application filed June 8, 1908. Serial No. 437,438.

To all whom it may concern:

Be it known that I, WILLIAM TATELBAUM, a subject of the Czar of Russia, residing at the city of St. Louis, State of Missouri, United States of America, have invented a certain new and useful Improvement in Amplifying-Horns, of which the following is a specification, reference being had to the accompanying drawings, forming a part hereof, in which—

Figure 1 is a longitudinal-sectional view on line 1—1, Fig. 2, of my improved horn, showing the regulating valve in adjusted positions in dotted lines; Fig. 2 is a cross-sectional view on line 2—2, Fig. 1; and Fig. 3 is a cross-sectional view on line 3—3, Fig. 1.

This invention relates to a new and useful improvement in amplifying horns for phonographs, talking machines, and the like. Heretofore, so far as I am aware, horns for such machines have at times been provided with means for regulating the volume of the tone or sound waves or vibrations issuing therefrom, but in all such horns the tone or sound waves or vibrations have been more or less metallic.

The object of my invention is to produce a horn provided not only with means for regulating the volume of the tone or sound waves, but also with means which eliminates substantially all metallic vibrations from the tone or sound waves issuing from the horn, such latter means also spreading and rounding out said tone waves, modulating or modifying the same and making them sweet and distinct.

With this object in view, my invention consists in the novel construction of the several parts of my horn and in the novel arrangement and combination of the same, all as will hereinafter be described and afterward pointed out in the claims.

In the drawings, 1 is the outer shell of the horn, which can be made of paper, paste-board, metal, or any other suitable material. It is, however, usually and preferably made of metal, in which case it is lined preferably with flannelette 2, which covers the entire inner surface of horn 1.

Mounted centrally within horn 1 is what I call the inner resonant body or modulating horn 3. Horn 1 is open at both ends and, as shown in Fig. 1, is of smaller diameter at

its inner end than at its outer end, the resonant body or horn 3 being also of smaller diameter at its inner end than at its outer end and also being somewhat smaller than horn 1, thereby providing a space therebetween for the sound or tone waves entering the smaller end of horn 1, as shown clearly in Fig. 1. This horn 3 is preferably made of wood, paste-board, or any other suitable non-metallic material; it could, however, be also made of metal, in which case it would be completely covered with woven fabric or paper, so as to prevent the tone or sound waves from the talking machine striking directly against metal.

The outer end of horn 3 is provided with a circular cover or head-portion 4, which may be either made integral with horn 3 or separately therefrom and riveted or otherwise secured thereto. This head-portion 4 is provided with sound openings 5, which are preferably covered by gauze 6. The head-portion 4 is also provided with radial spider arms 7, whose ends are bent and riveted or otherwise secured to horn 1, thereby holding the front end of horn 3 in proper position in horn 1. The reduced or contracted inner end of horn 3 is preferably attached to a cross-bar 8, which bar is riveted or otherwise secured to horn 1, whereby the inner end of horn 3 is held in proper position in said horn 1.

Slidably mounted in suitable openings in bar 8 and in a cross-member 9 of head-portion 4 and extending through body 3 is a rod 10. On the inner end of rod 10 is a disk valve 11, which is adapted when properly adjusted to close the inner end of horn 1 for purposes hereinafter described. On the outer end of rod 10 is mounted a knob or handle 12, whereby said rod may be conveniently manipulated, and a set-screw 13 is mounted in a lug 14 on the bar 9, so as to impinge against rod 10 to hold the same in adjusted positions.

The operation of the parts of my horn is obvious. The tone or sound waves from the machine enter the inner opening of horn 1 and, striking against or contacting with valve 11, are spread toward the sides of the horn. The inner horn 3, against which the tone or sound waves also strike, being provided with the sound openings 5, acts somewhat like a violin or other resonant body

and modifies or modulates said tone or sound waves, eliminating the harshness therefrom and making the same sweet, clear, round, and distinct. When the horn is in operative position on a talking machine or the like and the valve 11 is in its outermost position shown by dotted lines in Fig. 1, the tone or sound waves issuing from the horn are very low, but clear and distinct; as said valve is adjusted toward the larger end of the horn, the tone or sound waves issuing from the horn become louder and louder, in this way the volume of the tone or sound waves issuing from the horn being readily and easily regulated. As the parts of my horn against which the tone or sound waves strike are either non-metallic or, if metallic, covered by a non-metallic material, substantially all metallic vibrations in the tone or sound waves issuing from the horn are prevented; the inner horn 3 also assisting in eliminating any metallic vibrations in said tone or sound waves.

I have found from experience that my horn fully performs the objects heretofore stated. By the construction of my horn, substantially all metallic vibrations in the tone or sound waves are avoided; the volume of the tone or sound waves issuing from the horn is readily regulated; and the said tone or sound waves passing through and issuing from the horn are made by the means shown clear, mellow, and distinct.

While I have shown the inner body or horn 3 supported in position by the arms 7 and bar 8, it is obvious that other means could be provided for supporting the same in place; it is also obvious that, while said horn 1 and said inner horn or resonant body 3 are herein shown as being preferably circular in cross-section, they might, if desired, be of other shapes or forms, such as rectangular or horizontal, and also that other minor changes in the arrangement and construction of the several parts of my horn could be made and substituted for those herein shown and described without departing from the nature and principle of my invention.

Having thus described my invention, what I claim and desire to secure by Letters Patent is:

1. In an amplifying horn, the combination with an outer shell open at both ends, of a hollow resonant sound-modulating body adapted to be supported within but away from the sides of said shell, whereby a space is provided for the passage of sound-waves between the outer surface of said body and the inner surface of said shell, said body being provided with sound-openings in its front end and the sides of said body being otherwise solid and imperforate; substantially as described.

2. In an amplifying horn, the combina-

tion with an outer shell open at both ends and of smaller diameter at its inner end than at its outer end, of a hollow resonant sound-modulating body adapted to be supported within but away from the sides of said shell, whereby a passage for the sound-waves is provided between the outer surface of said body and the inner surface of said shell, said body being also of smaller diameter at its inner end than at its outer end and being provided with sound-openings in its front end, the sides of said body being otherwise solid and imperforate; substantially as described.

3. In an amplifying horn, the combination with an outer shell open at both ends and of smaller diameter at its inner end than at its outer end, of a hollow resonant sound-modulating body adapted to be supported within but away from the sides of said shell, whereby a passage for the sound-waves is provided between the outer surface of said body and the inner surface of said shell, said body being also of smaller diameter at its inner end than at its outer end and being provided with sound-openings in its front end, the sides of said body being otherwise solid and imperforate, and an adjustable valve adapted to close the inner end of said shell for regulating the volume of the sound waves entering thereinto; substantially as described.

4. In an amplifying horn, the combination with an outer horn, of a second horn mounted in said outer horn and provided with sound openings at its outer end, said horn being adapted to modify or modulate the tone or sound waves passing through said outer horn, a rod slidably mounted in said second horn, and a valve on said rod adapted to close the inner end of said outer horn for regulating the volume of the tone or sound waves entering thereinto; substantially as described.

5. In an amplifying horn, the combination with an outer horn, of a second horn supported in said outer horn and provided with sound openings at its outer end, said second horn being adapted to modify or modulate the tone or sound waves passing through said outer horn, a rod slidably mounted in said second horn, a valve on said rod adapted to close the inner end of said outer horn for regulating the volume of the tone or sound waves entering thereinto, and means for holding said rod in adjusted positions; substantially as described.

6. In an amplifying horn, the combination with an outer horn, of a second horn, means for supporting said second horn in said outer horn, a head portion on the outer end of said second horn and provided with sound openings, a rod slidably mounted in said second horn, a valve on the inner end of said rod, and a set screw mounted on said

head portion and adapted to impinge against said rod for holding said rod in adjusted positions; substantially as described.

5 7. In an amplifying horn, the combination with an outer horn, of a non-metallic covering for the inner walls of said horn, a hollow body supported within but away from the walls of said outer horn, whereby a space is provided between said body and said
10 horn for the passage of sound waves, said body being adapted to modify or modulate the tone or sound waves passing through said outer horn, and an adjustable valve adapted to close the inner end of said outer
15 horn for regulating the volume of the tone or sound waves entering thereinto; substantially as described.

8. In an amplifying-horn, the combination with an outer horn open at both ends,

of a hollow resonant body adapted to be 20 mounted in said outer horn and provided with sound-openings in its front end, the sides of said body being otherwise solid and imperforate, and supporting-members adapted to be attached to said outer horn 25 and to said body for supporting said body within, but away from the side walls of, said outer horn, whereby a passage for the sound-waves is provided between said body and said outer horn; substantially as de- 30 scribed.

In testimony whereof, I have signed my name to this specification in the presence of two subscribing witnesses.

WILLIAM TATELBAUM.

Witnesses:

EDGAR W. JACOBS,

ADOLPH H. BIENENSTOK.

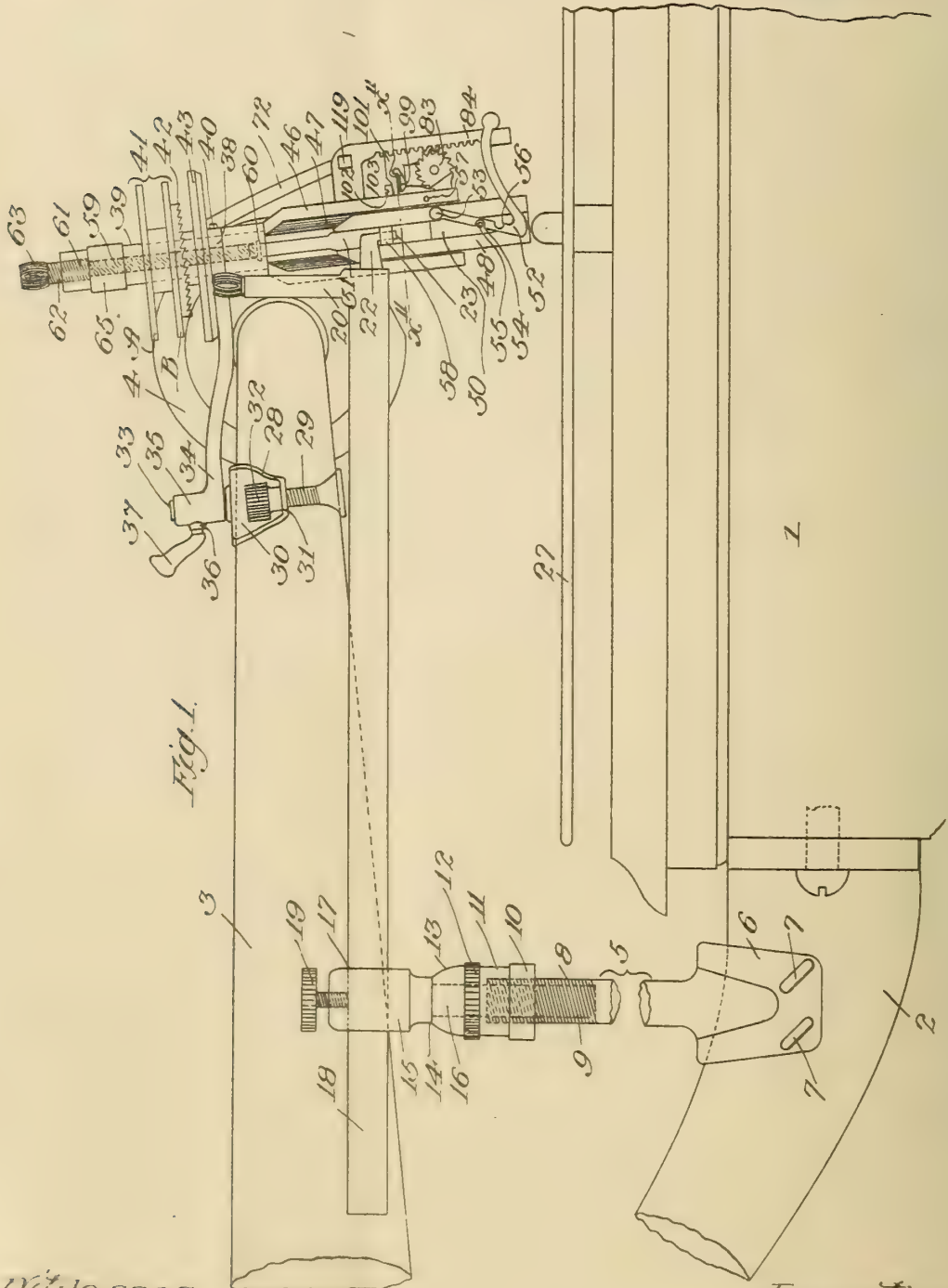


G. BUELNA & A. E. BURSON.
 STYLUS REPLENISHING MECHANISM FOR TALKING MACHINES.
 APPLICATION FILED DEC. 7, 1907.

931,676.

Patented Aug. 17, 1909.

5 SHEETS—SHEET 1.



Witnesses:
 J. A. Burson
 J. A. Coates

Inventors:
 Guadalupe Buena
 Arthur Edward Burson

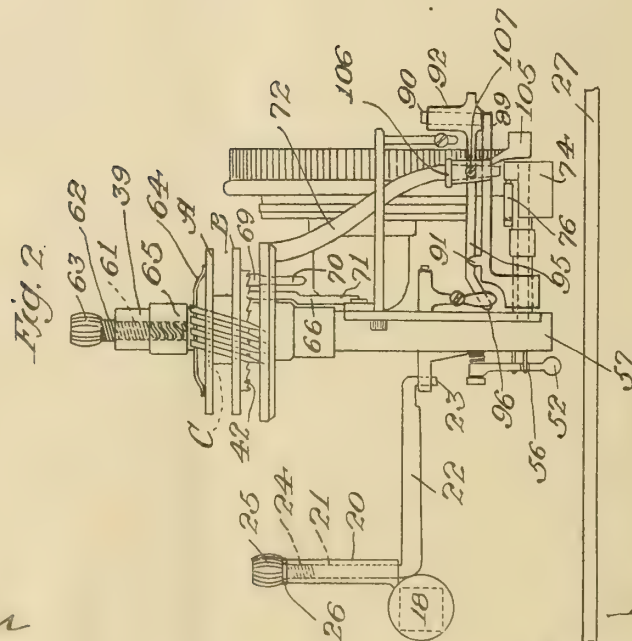
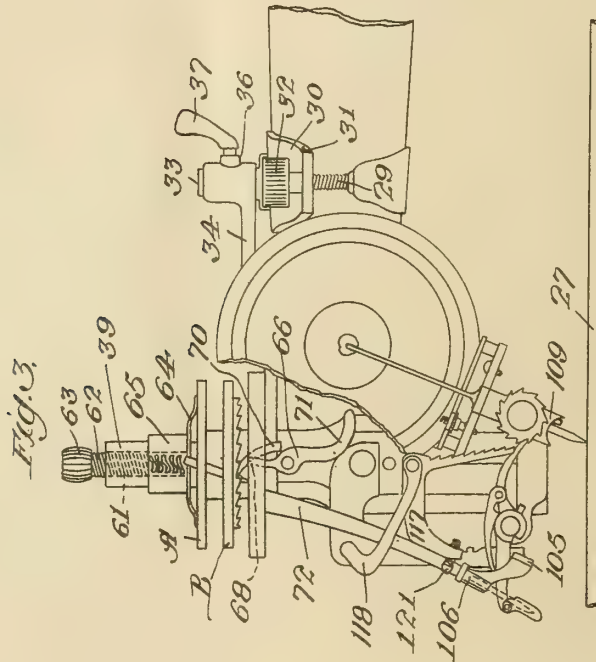


G. BUELNA & A. E. BURSON.
 STYLUS REPLENISHING MECHANISM FOR TALKING MACHINES.
 APPLICATION FILED DEC. 7, 1907.

931,676.

Patented Aug. 17, 1909.

5 SHEETS—SHEET 2.



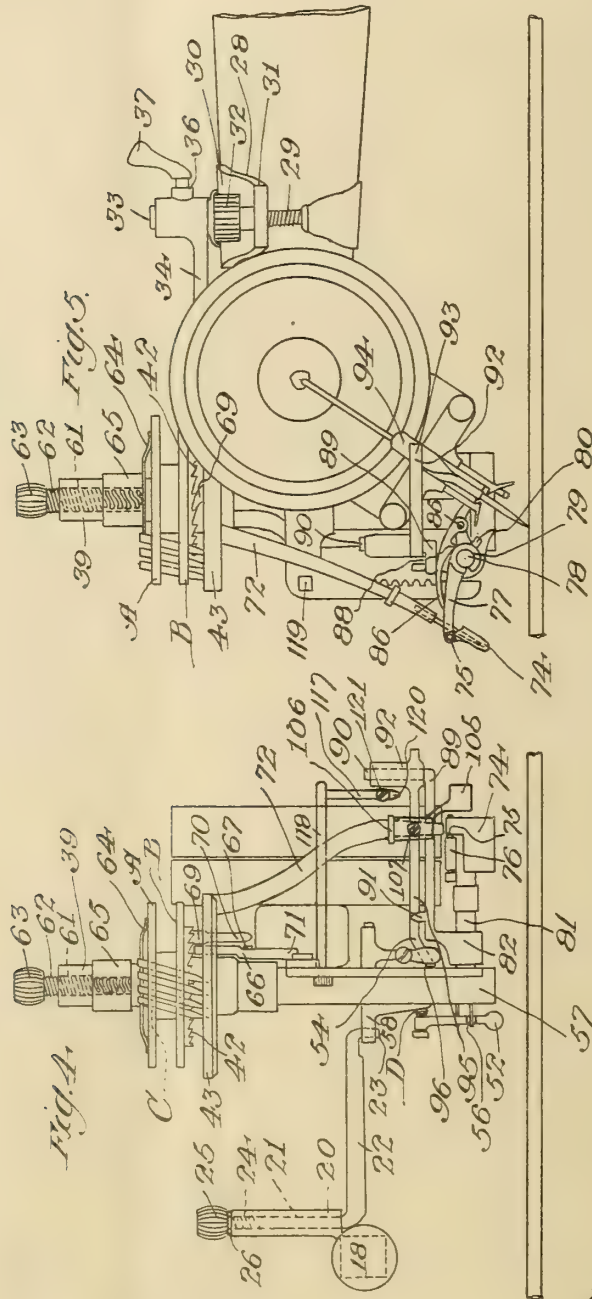
Witnesses:
 J. A. Burson
 J. A. Coates

Inventors:
 Guadalupe Buelna
 Arthur Edward Burson

G. BUELNA & A. E. BURSON.
 STYLUS REPLENISHING MECHANISM FOR TALKING MACHINES.
 APPLICATION FILED DEC. 7, 1907.

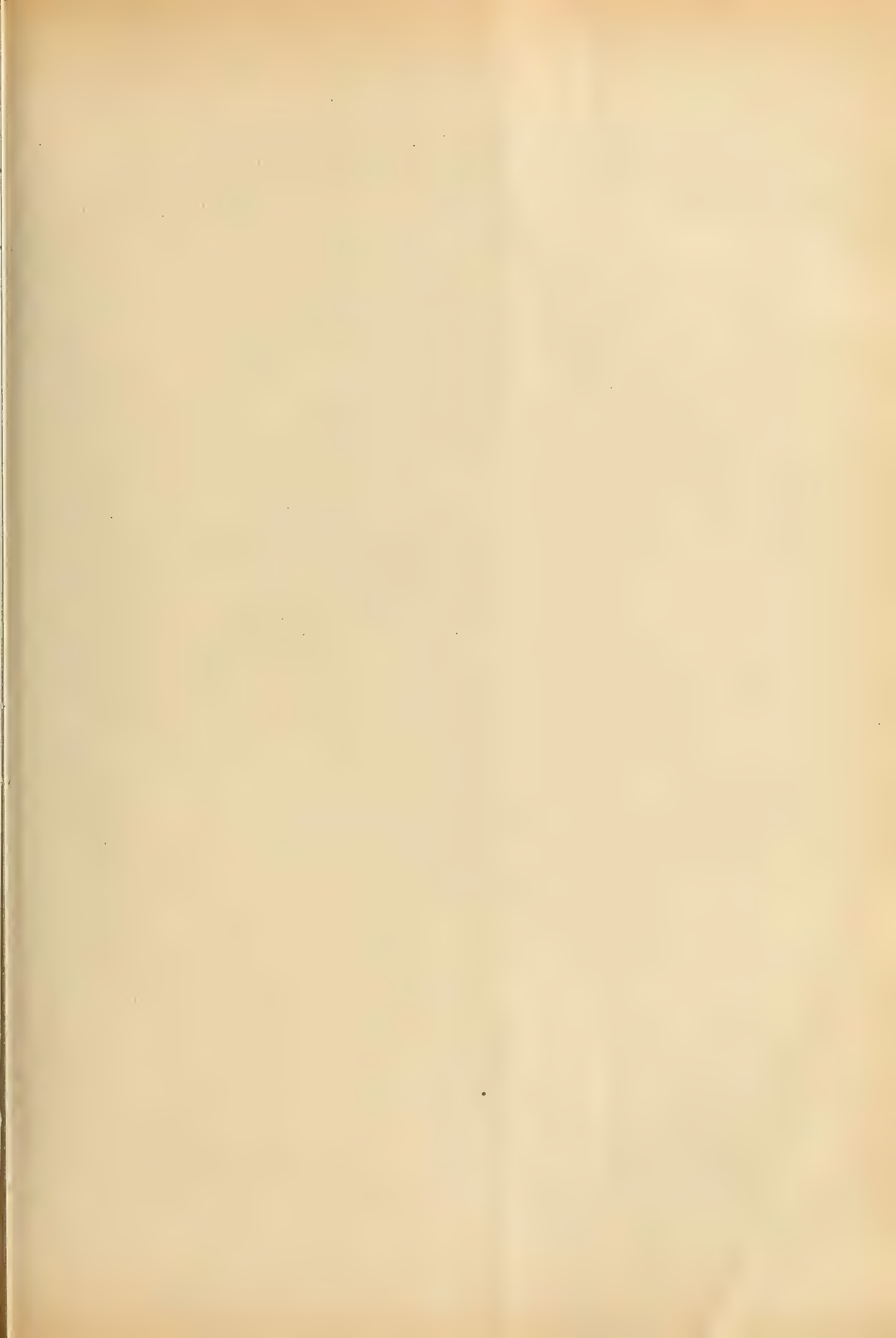
931,676.

Patented Aug. 17, 1909.
 5 SHEETS—SHEET 3.



Witnesses:
 J. A. Burson
 J. A. Coates

Inventors:
 Arthur Guadalupe Buelna
 Edward Burson

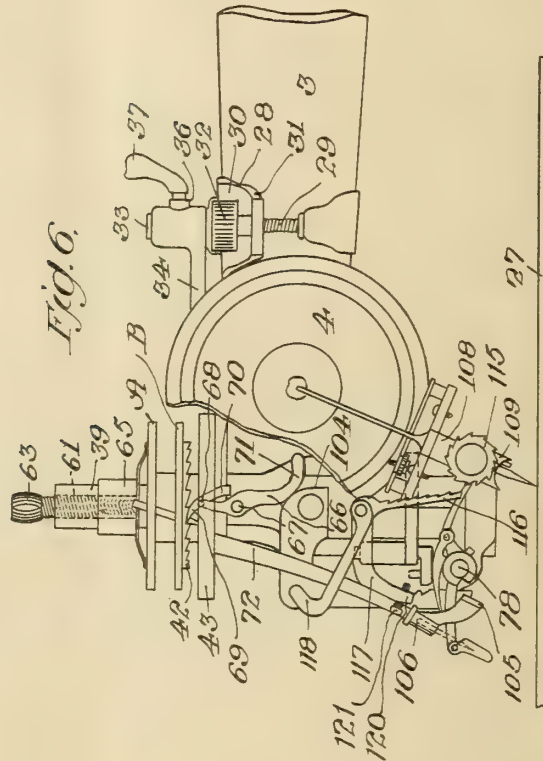


G. BUELNA & A. E. BURSON.
 STYLUS REPLENISHING MECHANISM FOR TALKING MACHINES.
 APPLICATION FILED DEC. 7, 1907.

931,676.

Patented Aug. 17, 1909.

5 SHEETS—SHEET 4.



Witnesses:
 J. H. Burson
 J. A. Coates

Inventors:
 Guadalupe Buelna
 Arthur Edward Burson

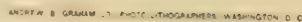


APPLICATION FILED DEC. 7, 1907.

Patented Aug. 17, 1909.

Nitricsses:
J. A. Burson
J. A. Coates

Inventors
Guadalupe Buelna
Arthur Edward Pearson



UNITED STATES PATENT OFFICE.

GUADALUPE BUELNA AND ARTHUR EDWARD BURSON, OF SANTA BARBARA, CALIFORNIA.

STYLUS-REPLENISHING MECHANISM FOR TALKING-MACHINES.

No. 931,676.

Specification of Letters Patent.

Patented Aug. 17, 1909.

Application filed December 7, 1907. Serial No. 405,522.

To all whom it may concern:

Be it known that we, GUADALUPE BUELNA and ARTHUR EDWARD BURSON, citizens of the United States, residing at Santa Barbara, in the county of Santa Barbara and State of California, have invented new and useful Improvements in Stylus-Replenishing Mechanism for Talking-Machines, of which the following is a specification.

10 This invention relates to a stylus replenishing mechanism and particularly to such mechanisms for use in connection with talking machines employing disk records.

15 An object of this invention is to provide a device for this purpose, in which the stylus of a sound box is caused to be ejected from the stylus holder, and a new stylus inserted in its stead by suitable stylus setting mechanism.

20 A further object of this invention is to supply such stylus setting mechanism with a fresh stylus whenever the stylus supplied thereto has been delivered to and inserted in the stylus holder, and to so arrange such mechanism that the various functions of the mechanism for carrying out these objects are performed in predetermined succession, all of such mechanism being controlled by the mere movement of the carrier arm for the sound box of a talking machine.

25 With these and other objects, not specifically mentioned herein, in view, this invention consists in the features, details of construction, and combination of parts, as will be described in connection with the accompanying drawings, and then be more specifically pointed out in the claims.

30 In the drawings: Figure 1 is a side elevation of our improved replenishing device, showing the same attached for operation to a talking machine; parts of the view are broken to contract the same. Fig 2 is a front elevation. Fig. 3 is a side elevation showing the device attached to a talking machine (the sound box being shown in fragment) and proper mechanism for adapting the replenishing mechanism to such machines known as the Zonophone or Victor. Fig. 4 is a front elevation showing the application of the replenishing mechanism to a Columbia talking machine. Fig. 5 is a side elevation looking to left of Fig. 4. Fig. 6 is a side elevation showing the application of the replenishing mechanism to a Zonophone or such machines in which the sound boxes are provided with screws for

clamping the stylus. Fig. 7 is a fragmentary side elevation showing the stylus setter in the act of delivering a stylus to the stylus-holder. Fig. 8 is a fragmentary sectional detail of stylus retaining mechanism for Zonophones. Fig. 9 is a detail of the stylus retaining toothed wheel and spring. Fig. 10 is a perspective view, illustrating the mechanism for actuating the stylus clamp to release a used stylus, preparatory to inserting another, the dotted lines indicating the active, and the full lines, the passive position of such mechanism. Fig. 11 is a detail sectional view of the trackway and carriage. Fig. 12 is a detail of the link for controlling the stylus releasing mechanism. Fig. 13 is a detail of the lever for releasing the stylus from frictional hold in the stylus holder. Fig. 14 is a detail of a funnel arranged to be fitted on the stylus holder of a Zonophone sound box. Fig. 15 is a detail plan of the spring arranged to hold the disk A of the magazine in place. Fig. 16 is a fragmental detail showing position of mechanism for releasing the stylus from the stylus holder, before the actuation thereof. Fig. 17 is a similar view showing the stylus releasing mechanism in position to cause the stylus to drop from the stylus holder. Fig. 18 is a plan view of one of the magazine disks, and Fig. 19 is a plan view of the platform, showing the opening in the delivery chute, the magazine proper being omitted.

1 designates the motor containing receptacle of the ordinary talking machine. 2 is a support in the nature of an arm removably attached to said motor containing receptacle. 3 is a sound box carrier arm swiveled, or otherwise attached and movable relatively to said supporting arm 2. 4 is a sound box carried by said carrier arm 3. Mounted on and detachably secured to said supporting arm 2 is a furcated post 5, the tines 6 of which straddle the supporting arm 2 and are provided with elongated slots 7 for the accommodation of set screws, or other fastening means not shown. The upper terminus of said post 5 is externally screw threaded, as seen at 8 and provided with a central bore 9, shown in dotted lines.

10 is an adjusting nut adapted to engage the threads 8 of the post 5. Said nut is united with a sleeve 11 having a threaded central bore, the said sleeve having integrally united therewith a thumb piece 12, by

means of which the adjustment of the nut is effected. 13 is a bearing on said thumb piece 12 for the shoulder 14 of the member 15, which is provided with a shank 16, extending within the bore 9 of the post 5. The said member 15 is provided with an aperture 17 rectangular in cross section to receive a bar 18 in which aperture the said arm is secured by the set screw 19. The bar 18 terminates in a hollow sleeve 20 into the bore 21 of which is fitted a bent supporting arm 22, which terminates in a tang 23. One end of the bent supporting arm is screw threaded as seen at 24, and 25 designates a set nut which engages the threads 24 of the said supporting arm 22.

26 is a washer interposed between the nut 25 and the upper end of the sleeve 20.

By the mechanism thus far described, it will be seen that the distance of the bar 18 from the surface of the record 27 is capable of regulation to render the mechanism to be presently made the subject of more detailed description, susceptible of use with all talking machines of the disk type, where variations in mechanical construction are not infrequently present.

28 is a strap adapted to encircle the sound box carrier arm 3. This strap 28 terminates on one end in a screw threaded shank 29 and on the other end in a cup 30, which is provided with an orifice 31. The shank 29 is arranged to extend through the orifice 31 of the cup 30 and there to be engaged by a thumb nut 32, which is adapted to tighten the strap on the sound box carrying arm of the talking machine.

33 designates a short post provided on the strap 28.

34 is an arm provided with a sleeve 35, having a screw threaded opening 36 to receive a lever 37 by the manipulation of which the arm 34 is locked in any position of adjustment. This arm 34 terminates in a loop 38 which fits over a tube 39. 40 designates a screw for preventing the accidental movement of said tube 39 relatively to the arm 34. Fitting over the tube 39 is a magazine 41, consisting of two separated disks A and B, each of which is provided with a circumferential row of perforations C which perforations in the respective disks A and B are out of perpendicular alinement relatively to each other, so that a stylus extending through the perforations of both disks stands at an angle to the vertical axis of the tube 39 as seen in Figs. 2-3-4-5 and 6. The disk B is provided on its under surface with an annular rack 42. 40¹ designates a set screw extending through a slot 40² provided in the platform 43 under the magazine disk B and arranged to secure the carriage and trackway on the arm 34 and against rotation, and also to permit of the adjustment of the same to adapt it to varying angles.

43 is a disk like platform, secured to or made a part of said tube 39. This platform is dished as seen at 44 Fig. 19 and has an up-turned peripheral edge whose function is to prevent the stylus from escaping from the magazine.

The tube 39 above referred to terminates in a bifurcation 46, which forms substantially a carriage, the said bifurcation 46 being provided with rails 47. 48 is a trackway, having grooves 49 arranged to engage said rails 47 and ride thereon. The said trackway is slotted centrally thereof as seen at 50 to receive a plunger 51, whose upper end extends into tube 39. The plunger 51 is normally connected with said trackway, to have contemporaneous movement therewith, by a crank 52 pivoted to said carriage at 53. A spring D is coiled about the shank of the pivot 53, which spring exerts its tension against the crank, thereby causing the crank to frictionally bear against the head of the pivot, in this manner preventing the accidental release of said crank when the detent is in engagement with the pin of the trackway or the pin of the carriage, respectively, which release is apt to be caused by the vibratory action of the stylus while traversing the sound waves of the record. The crank 52 is provided with a detent 54 on one side to engage the pin 55 fixed on the plunger 51 whereby the trackway and plunger are mutually interlocked. A similar detent 56 is provided on the opposite side of said crank 52 to engage a pin 57 provided on the bifurcation 46, for normally holding the crank out of operative position. In this position of the crank, that is to say, when the detent 56 is in engagement with the pin 57, the plunger is free to move independently of the trackway 48, which provision is made for the purpose of permitting of the movement of the carrier arm for the sound box, without operating the stylus replenishing mechanism for the sound box.

The plunger 51 has an apertured lug 58, into which the tang 23 of the supporting arm 22 is arranged to fit and to be secured therein. In this manner it will be noted that the trackway 48 is stationary relatively to the carriage 46, and the constituent parts thereof, which trackway as has been before described is rigidly attached to the sound-box carrier arm, while the trackway itself is rigid with the supporting arm 22.

59 is a spiral spring located within the bore of the tube 39 and arranged to impinge against the collar 60 fixed on to the plunger 51. The tube 39 at its upper extremity is internally threaded as seen at 61 to receive the shank 62 of an adjusting member 63. By this construction the carriage and the magazine etc. are resiliently supported on the plunger 51 and the height and the movement of the carriage and sound box rela-

tively to the trackway regulated and limited by the adjusting member 63.

To prevent the accidental rotation of the magazine proper, we provide a spring 64, loosely fitting over the tube 39 and caused to engage the upper surface of the magazine disk A by a sleeve 65, which snugly and frictionally engages the tube 39 and which when in its correct position presses the spring 64 against the disk A.

66 designates a lever fulcrumed by a fulcrum pin 67 on to the tube 39. On one end of said lever is pivoted by a pivot pin 68, a pawl 69, having free movement in one direction, but a limited movement in another direction. For this purpose the end of the pawl is extended as seen at 70 and so arranged that it is in direct line with the fulcrum pin 67 of the lever 66. Thus upon the operation of the lever 66, the fulcrum pin 67 strikes the extended portion 70 of the pawl and causes said pawl 69 to travel with said lever. Both lever 66 and pawl 69 extend through an opening provided therefor in the platform 43, the said pawl 69 being in direct line and in engagement with the annular gear face 42 provided on the underside of the disk B forming part of the magazine 41. Upon the operation therefore of the lever 66, the pawl 69 moving therewith, produces a rotation of the magazine 41, equal to one tooth in the annular gear face 42. The end of the lever 66 is weighted as seen at 71, so that upon the recession of the mechanism for operating said lever 66, the said lever by gravity drops back to its normal position, carrying with it the pawl 69 which, having an operating tendency in but one direction, rides over the teeth of the annular gear face 41, preparatory to the succeeding operation of the lever for rotating said magazine to cause a fresh stylus to drop and travel in the chute provided therefor.

To the platform 43 is attached a tube, or more properly, a delivery chute 72, the entrance to the bore of which is located at or near the outer periphery of the same, as seen at 73, and in a direct line with the points of the styli with which the magazine 41 is supplied. The rotation, therefore, of the said stylus magazine for a distance equal to one tooth of the gear face 42 on the disk B, causes a stylus at each such predetermined rotation of the magazine, to enter the delivery chute 72. From this chute it is discharged into a stylus setter 74 hingedly hung from a pintle 75, which extends through a sleeve 76 provided on a crank arm 77. The crank arm 77 is secured to a shaft 78, the said crank arm being provided with a strap 79, which is provided with a lug 80 for purposes to be more fully hereinafter set forth. The said shaft 78 extends through a sleeve 81, which is fixedly secured to a boss, 82,

made integral with the carriage. This shaft 78 has mounted on one end of the same a mutilated pinion 83, being provided for a portion only of its peripheral circumference with teeth. This pinion 83 is in direct line with a rack 84, rigidly fastened to the trackway 48, and arranged to remain stationary during the movement of the carriage 46, which movement, as the rack engages the pinion, causes the shaft 78 to revolve and at the same time carry with it the stylus setter carried thereby, which stylus setter, describing the arc of a circle, brings the stylus in direct line with the opening in the stylus holder wherein it is thereupon clamped. On the strap 79 is a pivot 85 for pivoting a lever 86, one end of which is designed to extend in the rear of the stylus and the other end of which extends over and in direct line with the lug 80, this said other end being heavier, so that gravity normally holds the said lever in position. The heavier part of this lever has a shoulder 88. The travel of the stylus setter to deliver a fresh stylus into the stylus holder in the sound box, causes the lug 80 on the strap of the stylus setter to strike against said shoulder 88 and in this manner to actuate said lever so that it is brought to bear against the rear of the stylus thereby causing it to be released from its frictional hold and to escape from the stylus holder. The said boss 82 has united therewith an arm 89 terminating in a pivot 90 and also provided with a yoke 91. Pivoted to the pivot 90 is a bell crank lever 92, one arm of which, namely 93, is arranged to extend in operative relation to the resilient jaws of the stylus holder 94, where such stylus holding mechanism is employed; the other end 95 of said bell crank lever 92 extends between the yoke 91 and curves downwardly toward its end as seen at 96, where it terminates in a shelf 99.

On the carriage 48 is pivotally mounted by the pivot 100 a link 101, provided with an adjustable set screw 102 and with an abrupt shoulder portion 103, shown in dotted lines in Fig. 10. This shouldered portion 103 is normally in engagement with the extremity of the arm 95 of the lever 92 so that the movement of the carriage relatively to the trackway causes said arm 95 of the lever 92 to turn on its pivot 90 and thereby exert pressure against the jaws of the stylus holder, thus relieving the tension and allowing the stylus to fall. The continued elevation of the trackway carrying with it the bell crank lever 92 carries the link 101 with it until it approaches a horizontal position where the set screw 102 strikes the shelf 99 and removes the pressure of the arm 93 of the bell crank lever 92 from the clamping stylus holder 94 the moment that the stylus is inserted in the stylus holder, thus causing it to be clamped while

at the same time the action of the spring, assuming its normal position, bears against the bell crank lever and resets it preparatory to the next operation.

5 In order to accomplish the setting of the stylus in the stylus holder, an upward movement of the trackway relatively to the carriage is necessary. Upon the return movement of the carriage relative to the trackway, the weighted lever 71 strikes against an abutment 104 whereby the magazine is caused to travel a distance equal to one tooth of the annular gear face 42 provided on the disk B.

15 The mechanism thus far described, which relates to the means for releasing a used stylus, is applicable to such machines known as the Columbia and Victor talking machine, in which resilient means, specifically a spring, are employed to clamp the stylus in place, and to all sound boxes employing a lever to clamp the stylus.

In order to render the replenishing mechanism susceptible of use with machines known as the phonograph or Victor with sound boxes employing a screw to clamp the stylus, we have made the following provision: On the chute 72, is a shelf 105 made integral with a socket 106 arranged to be detachably fitted over the end of the chute 72, and to be secured in place by screw 107. 109 designates a funnel or guide arranged to frictionally engage the end of the stylus holder 108. Said funnel is provided with an orifice 111 which when in place registers exactly with the opening in the stylus holder 108. It is also provided with a curved face 110 at the center of the curvature of which is the aforesaid opening or orifice 111 through which the stylus is arranged to extend. This curved face is designed to prevent the stylus from missing the opening in the funnel when the stylus setter traverses the distance from the chute end to the stylus holder. The new stylus, when by reason of any defective adjustment of the stylus setter, strikes against the curved face, and is caused in this manner to enter the orifice or opening 111 of the curved face 110. Extending through the stylus holder 108 is a screw threaded shank 112 provided with a shoulder 113 arranged to bear against the stylus holder 108. Around this shoulder portion is coiled a spring 114 one end of which is fixed to said shoulder 113, and the other end of which is fixed to the stylus holder 108. A toothed wheel 115 is integrally united with the shoulder portion 113. The shoulder portion is provided for the purpose of permitting the screw threaded shank to rotate but for a limited extent when the stylus holder is not supplied with a stylus, which limited rotation however is sufficient to clamp an inverted stylus. Adapted to be thrown into engagement with

said toothed wheel 115 is a rack 116, made a part of an inverted U-shaped member 117, which is pivotally mounted on an arm 118, removably fitting into an opening 119 provided in the rack 84 of the carriage. The tine 120 of the inverted U-shaped member 117 has an adjusting screw 121, which upon the operation of the carriage relative to the trackway strikes against the shelf 105, thereby causing the rack 116 to engage the toothed wheel 115 for a predetermined period sufficient to actuate the toothed wheel to release the used stylus and allow a fresh stylus to be inserted, whereupon the adjusting screw clearing the shelf 105 causes the immediate disengagement of the rack with the toothed wheel 115, which by reason of the spring clamps the new stylus in the stylus holder.

What we claim is:

1. In a stylus replenishing device for talking machines, etc., a carriage attachable to a movable part of such machine, a trackway attachable to a stationary part of such machine, and mutually coöperating means carried by each such mechanism for inserting a stylus in the stylus holder of a sound box.

2. In a stylus replenishing mechanism for talking machines, etc., movable mechanism, stationary mechanism, a stylus setter, a pinion on said stylus setter, and means carried and operable by the relative movement of such mechanisms for operating said stylus setter to release a used stylus and insert another.

3. In a stylus replenishing mechanism for talking machines, etc., movable mechanism provided with a magazine, stationary mechanism, means carried and operable by the movement of one mechanism relatively to the other for releasing a used stylus from the sound box and inserting another, and means carried by said stationary mechanism for actuating said magazine.

4. In a stylus replenishing device for talking machines, etc., movable mechanism provided with a stylus magazine, stationary mechanism, provided with means for imparting motion to said magazine, a stylus setter on said stationary mechanism, arranged to be operated by the movement of the said movable mechanism relative to said stationary mechanism, and means to hold said stylus setter inoperative during the movement of said movable mechanism relative to said stationary mechanism.

5. A sound box support, a carriage stationary relatively to said support, a trackway movable relatively to said carriage and with said sound box support, and means connected with said carriage and trackway respectively, mutually coöperating to release a used stylus from the sound box and insert another.

6. In a stylus replenishing device for talk-

ing machines, etc., mechanism attachable to a movable part of such machine, said mechanism being provided with a stylus magazine, mechanism attachable to a stationary part of such machine and provided with a stylus setter, means carried by said stationary mechanism to actuate said stylus setter and to release a used stylus from the sound box and insert another in the sound box, and means operable for the movement of said movable mechanism for actuating said magazine to discharge a fresh stylus therefrom.

7. In a stylus replenishing device for talking machines, etc., the combination with a trackway, adapted to be attached to a stationary part of a talking machine, a stylus setter on said trackway, a carriage carried by said trackway and operable relatively thereto, a magazine on said carriage, means for operating said stylus setter to feed a fresh stylus to the sound box, means carried by said carriage for releasing a used stylus from the sound box, and means carried by said trackway and operable by the movement of said trackway relatively to said carriage for actuating said magazine.

8. In a stylus replenishing device for talking machines, etc., the combination with a trackway, of means on said trackway for feeding a fresh stylus to the sound box of a talking machine, a carriage operable on said trackway, a magazine on said carriage, and means for actuating said feeding means.

9. In a stylus replenishing device for talking machines, etc., the combination with a trackway and a support therefor, of a stylus setter on said trackway, a carriage operable on and relatively to said trackway, a magazine on said carriage and means operable by the movement of said carriage relatively to said trackway for actuating said stylus setter.

10. In a stylus replenishing device for talking machines, etc., the combination with a trackway and a rigid support therefor, of a stylus setter on said trackway, a carriage on said trackway, and means carried by and operable by the movement of said carriage relative to said trackway for actuating said stylus setter to set a fresh stylus in the sound box.

11. In a stylus replenishing device for talking machines, etc., the combination with a trackway and a support therefor, of a stylus setter on said trackway provided with a pinion, a carriage on said trackway, a magazine on said carriage, means carried by said carriage for actuating said pinion to cause said stylus setter to set a stylus in the sound box and means actuable by the movement of said carriage relatively to said trackway for releasing a used stylus from the sound box.

12. In a stylus replenishing device for talking machines, etc., the combination with

a trackway, and a support therefor, of a stylus setter and a stylus releasing mechanism on said trackway, a carriage operable on said trackway, a magazine on said carriage, means operable by the movement of said carriage in one direction to release a used stylus from the sound box, and insert a new stylus, and means controllable by the movement of said carriage in another direction to deliver a stylus in said stylus setter.

13. A trackway provided with a stylus setter, a carriage operable on said trackway, means carried by said carriage to actuate said stylus setter to release a used stylus and insert another, and a magazine carried by said carriage.

14. A stationary element, a stylus setter carried by said stationary element, a pinion on said stylus setter, a movable element, means carried by said movable element to engage said pinion and actuate said stylus setter, and means operable by the relative movement of said stationary element and said movable element to release a used stylus and insert another.

15. In a talking machine, the combination with a stylus setter, of means positively engaging the stylus to dislodge it from the sound box, and means to actuate both said setting mechanism and said dislodging means.

16. In a talking machine, the combination of a stylus releasing mechanism, a mechanism positively engaging the stylus to dislodge the same, a stylus setting mechanism, means for supplying a stylus to said stylus setting mechanism, and means for actuating said stylus supplying mechanism.

17. In a talking machine, the combination of a mechanism positively engaging the stylus to dislodge the same, a stylus setting mechanism, a supply for the setting mechanism, and means for successively operating said mechanisms.

18. In a talking machine, the combination with a sound box, a carrier therefor and a support for said carrier, of a trackway, means for adjustably mounting said trackway on said support, a stylus setter on said trackway, a pinion for operating said stylus setter, a carriage mounted on said carrier, a stylus magazine on said carriage, means carried by said carriage to engage said pinion for actuating said stylus setter, means actuable by the movement of said carriage relatively to said trackway for operating said stylus magazine to deliver a fresh stylus to said stylus holder, and mechanism periodically operable for releasing a used stylus and clamping another.

19. In a stylus replenishing device for talking machines, etc., the combination with a trackway, and an adjustable support therefor, of a stylus setter on said trackway, a pinion connected with said stylus setter, a

stylus releasing lever on said trackway, a carriage on said trackway, a stylus magazine on said carriage, means carried and operable by the movement of said carriage relative to said trackway, for operating said stylus releasing lever for rotating said pinion to actuate said stylus setter, and means for rotating said magazine.

20. In a stylus replenishing device for talking machines, etc., the combination with a sound box, having a stylus holder, and a carrier therefor, of mechanism attachable to a stationary part of such machine provided with a stylus releasing and setting mechanism, mechanism attachable to a mov-

able part of such machine provided with a stylus magazine, and means actuable by the movement of said movable mechanism in one direction for operating said stylus releasing and setting mechanism, and in the opposite direction for actuating said stylus magazine.

In testimony whereof we affix our signatures, in presence of two subscribing witnesses.

GUADALUPE BUELNA.

ARTHUR EDWARD BURSON.

Witnesses:

J. H. BURSON,

IDA M. BAGLEY.



M. A. POSSONS.
NEEDLE HOLDER FOR SOUND BOXES.
APPLICATION FILED AUG. 8, 1908.

931,957.

Patented Aug. 24, 1909.

Fig. 1.

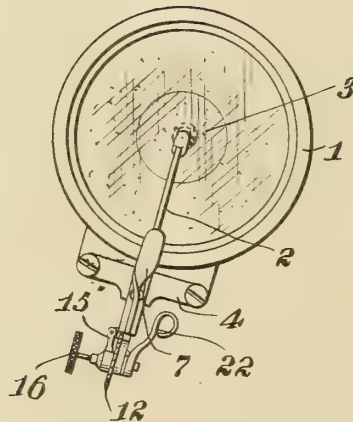


Fig. 5.

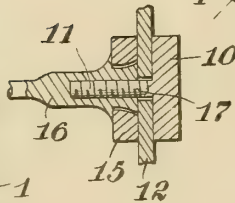


Fig. 2.

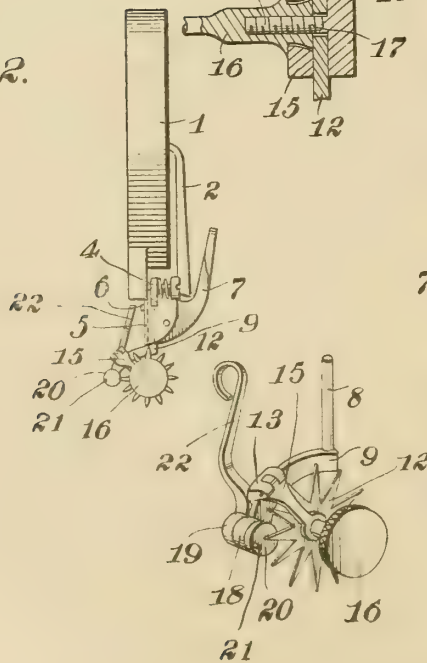


Fig. 3.

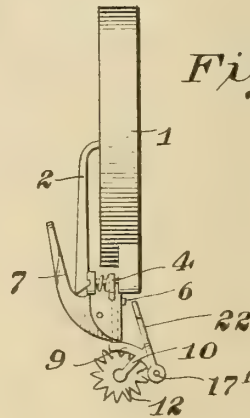
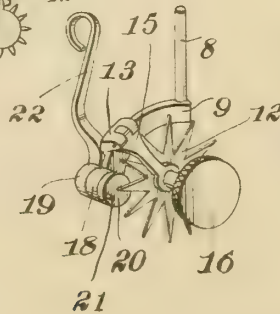


Fig. 4.



Inventor

M. A. Possons

By

A. S. Pattison

Attorney

Witnesses
C. H. Wright, Jr.
J. A. Bishop

UNITED STATES PATENT OFFICE.

MINARD ARTHUR POSSONS, OF CLEVELAND, OHIO.

NEEDLE-HOLDER FOR SOUND-BOXES.

931,957.

Specification of Letters Patent. Patented Aug. 24, 1909.

Application filed August 8, 1908. Serial No. 447,569.

To all whom it may concern:

Be it known that I, MINARD ARTHUR POSSONS, a citizen of the United States of America, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Needle-Holders for Sound-Boxes, of which the following is a specification, reference being had therein to the accompanying drawing.

My invention relates to improvements in needle holders for sound boxes.

The object of my invention is to provide a needle holder adapted to support a rotatable needle and said holder adapted to be secured in the needle receiving socket of the sound box.

Another object of my invention is to provide a needle holder of this character which can be made independent of the sound box and secured within the needle receiving socket of the ordinary sound box.

In the accompanying drawings, Figure 1 is a side view of my improved needle holder attached to the ordinary sound box now in use. Fig. 2 is an edge view of Fig. 1 looking in the direction of the arrow shown in Fig. 1. Fig. 3 is an edge view looking in the opposite direction from Fig. 2. Fig. 4 is an enlarged perspective view of the needle holder as it would be manufactured and sold to be adapted to the ordinary sound box. Fig. 5 is an enlarged sectional view showing the swivel connection of the thumb-nut with the swinging arm.

Referring now to the drawings, 1 represents an ordinary sound box having the usual arm 2 connected to the center of the diaphragm 3, the outer end of said arm connected to the spring operated member 4 carrying the needle receiving socket 5. In sound boxes of this character the needle is either secured in the said socket by a set screw 6 or by a cam lever 7, and in some instances by both the set screw and the cam lever. While I have shown and described this form of sound boxes to show the application of my needle support, it will be understood that any form of sound boxes may be used, as sound boxes all use a needle receiving socket. Therefore it will be seen that my improved needle holder can be readily secured to any sound box using a needle socket.

My improved needle holder consists of a shank 8 adapted to enter the needle receiv-

ing socket of the sound box and secured therein by means of the said screw or cam lever in the same manner that the ordinary needle is secured in the socket. The lower end of the shank 8 has secured firmly and rigidly therewith a curved plate 9, and said curved plate intermediate its ends is provided with a downwardly extending arm 10. The lower end of said arm is provided with an inwardly extending screw threaded stud 11, and upon which is mounted the disk needle 12. This needle as shown is stamped from a piece of sheet metal having serrations in its outer periphery forming a series of independent needles whereby the needle does not have to be moved for each record.

The upper edge of the curved plate 9 opposite the arm 10 is provided with the lugs 13 and 14, between which is mounted a swinging arm 15, the lower end of which is adapted to swing down opposite the stud 11 and surround the outer end thereof. Swiveled within the lower end of said arm 15 is a thumb nut 16 having at its inner end an internally screw threaded socket 17, which is adapted to be screwed to the outer end of the stud 11 and frictionally clamp the needle 12 against the arm 10 and hold the same against rotation. The thumb nut 16 as will be understood, is not screwed tight enough to absolutely prevent this needle 12 from being rotated, but sufficiently tight to prevent it from being moved by frictional contact with the record disk of the talking machine, and therefore when the needle is set, it is held in said position.

In order to provide means for rotating the disk needle a distance to bring a different point in contact with the record disk, I provide the lower end of the arm 9 with an enlarged portion 18 through which passes a rotatable shaft 17'. The outer end of said shaft has rigidly secured thereto a disk 19 carrying the crank arm 22. The inner end of said shaft has rigidly secured thereto a disk 20. The inner face of the disk adjacent to its outer edge is provided with an inwardly extending pin 21 which is adapted when the disk is rotated, to engage one of the points of the needle and rotate it a sufficient distance to bring another point in position on the record disk of the talking machine.

By the construction herein set forth it will be seen that I have produced a needle holder adapted to removably hold a disk needle in

such a position that it will assume the proper position upon the record disk and at the same time allowing of the ready removal of the needle when all the points have been used, and the whole device adapted to be removably attached to the ordinary sound box as heretofore set forth.

Having thus fully described the invention what is claimed as new, is:--

10 1. The combination with a sound box having the usual needle receiving socket, of a needle holder removably secured in said socket, a rotatable needle removably secured to said holder and having a series of needle
15 points on its outer periphery, and means carried by the holder for rotating the needle.

2. The combination with a sound box having the usual needle receiving socket, of a needle holder comprising a shank adapted
20 to be clamped in the needle receiving socket, a downwardly extending arm rigidly carried by the lower end of said shank, a horizontal stud carried by said arm, a rotatable needle mounted on said stud, a swinging
25 member carried by the arm, a thumb nut swiveled in the lower end of the swinging arm and adapted to be screwed on the stud on the outside of the needle, a rotatable shaft carried by the arm and means carried by
30 the shaft for rotating the needle.

3. The combination with a sound box having a needle receiving socket, of a needle holder comprising a shank adapted to be clamped in the needle receiving socket, a curved arm rigidly carried by the lower end
35 of said shank, a second arm carried by the curved arm intermediate its end, a horizontal stud carried by the lower end of said second arm and externally screw threaded, a disk needle mounted upon said stud, a mem-
40 ber pivotally secured to the arm intermediate its ends, a thumb nut swiveled in the lower end of said member and adapted to be screwed upon the stud and clamping the disk needle in its operative position, a shaft
45 rotatably mounted in the lower end of said arm, a small disk carried by the inner end of said shaft, a pin carried by the inner face of said disk and adapted to engage the disk needle and rotate the same a distance suffi-
50 cient to bring another point of the needle in position on the record during each rotation of the shaft.

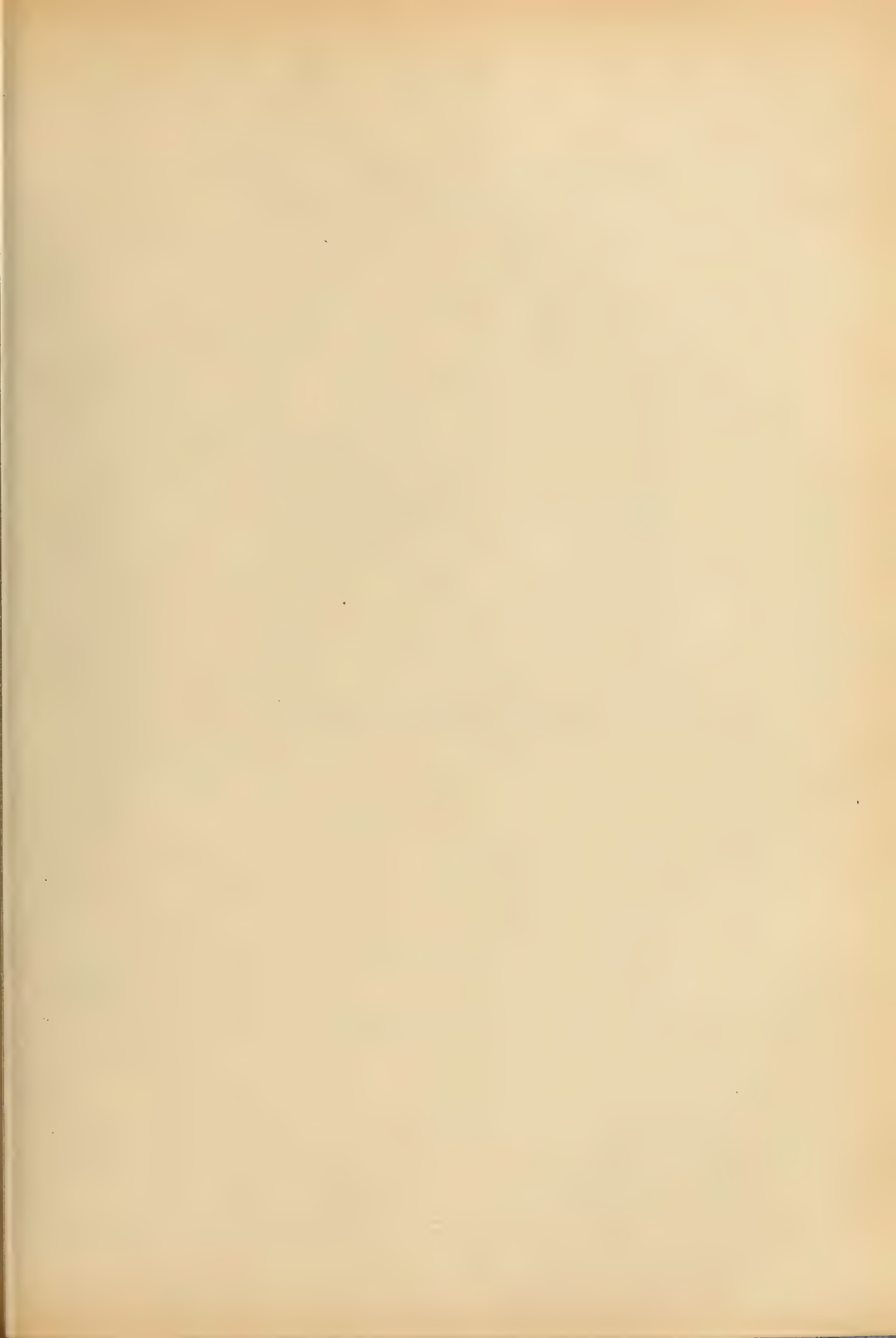
In testimony whereof I affix my signature in presence of two witnesses.

MINARD ARTHUR POSSONS.

Witnesses:

T. M. SOURBECK.

FRED. T. BATCHELOR.



E. S. OLIVER.
SOUND MODIFYING MEANS FOR TALKING MACHINES.
APPLICATION FILED OCT. 31, 1907.

932,055.

Patented Aug. 24, 1909.
2 SHEETS—SHEET 1.

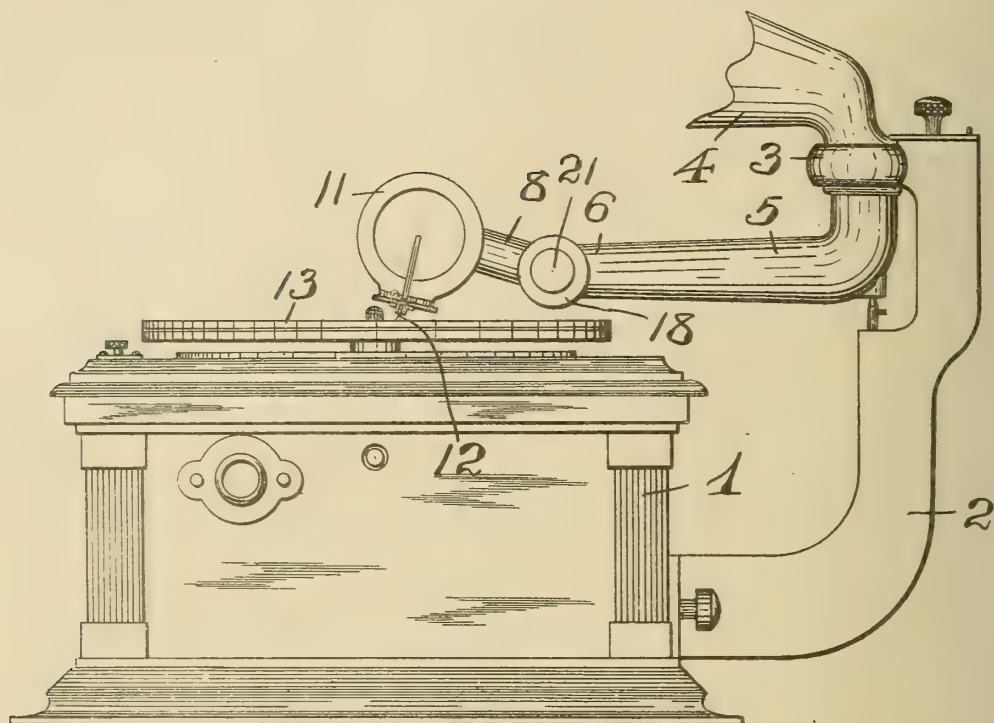


Fig. 1

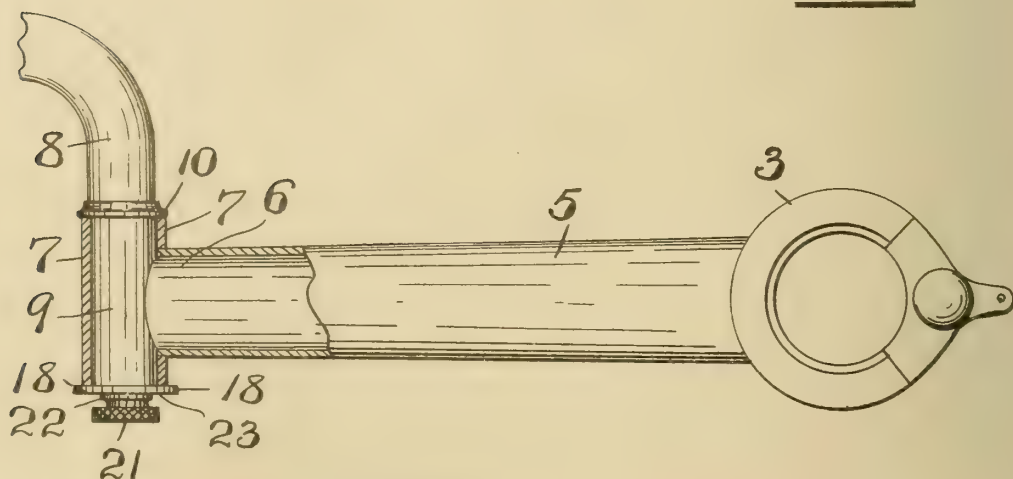


Fig. 2

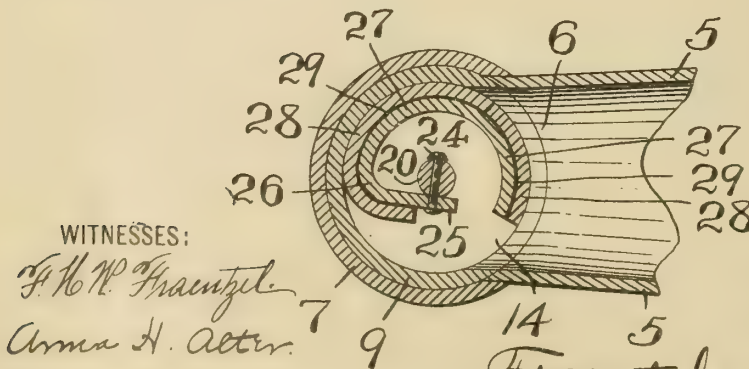
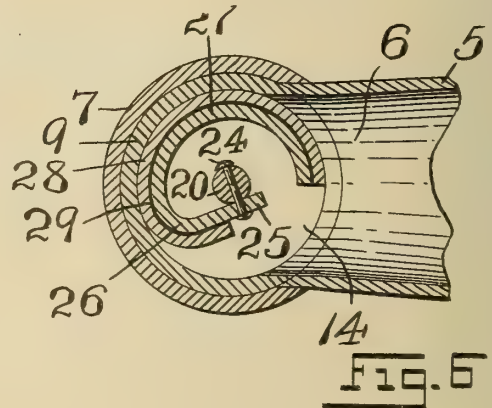
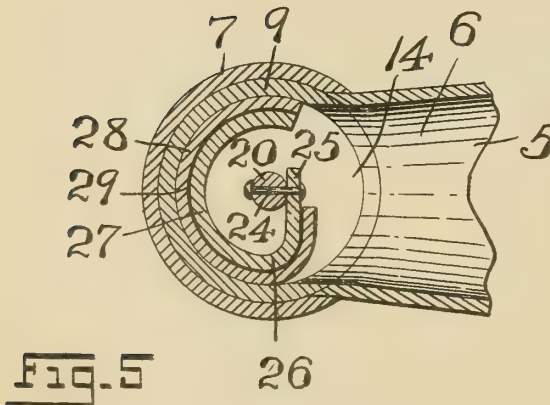
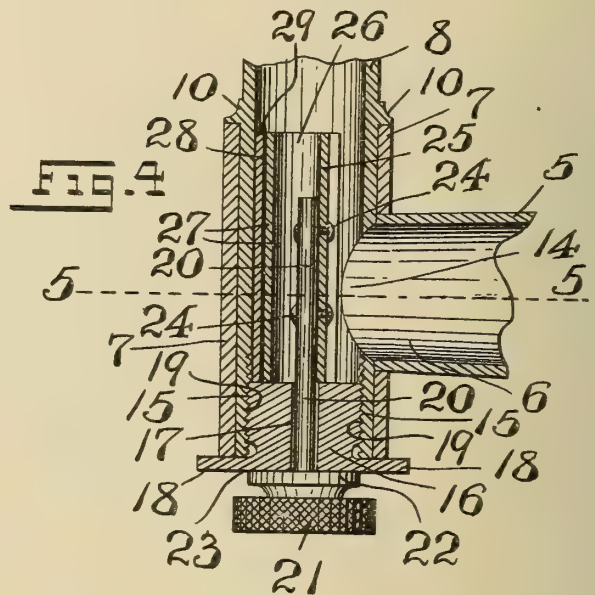
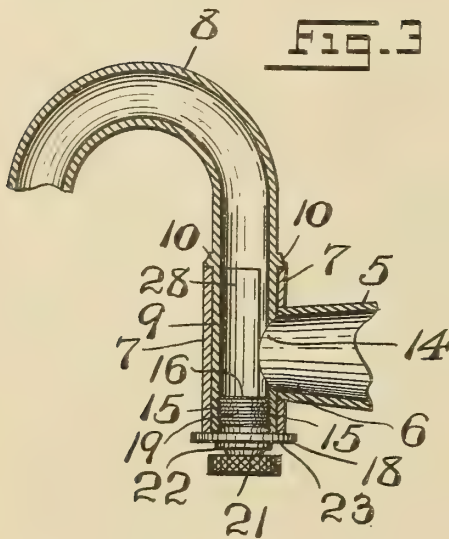
WITNESSES:
J. H. W. Fraentzel
Anna H. Alter

INVENTOR:
Ellis S. Oliver,
BY
Fraentzel and Richards,
ATTORNEYS

E. S. OLIVER.
SOUND MODIFYING MEANS FOR TALKING MACHINES.
APPLICATION FILED OCT. 31, 1907.

932,055.

Patented Aug. 24, 1909.
2 SHEETS—SHEET 2.



WITNESSES:
F. H. W. Fraentzel.
Anna H. Alter.

INVENTOR:
Ellis S. Oliver,
BY
Fraentzel and Richards.
ATTORNEYS

UNITED STATES PATENT OFFICE.

ELLIS S. OLIVER, OF NEWARK, NEW JERSEY.

SOUND-MODIFYING MEANS FOR TALKING-MACHINES.

932,055.

Specification of Letters Patent. Patented Aug. 24, 1909.

Application filed October 31, 1907. Serial No. 400,113.

To all whom it may concern:

Be it known that I, ELLIS S. OLIVER, a citizen of the United States, residing at Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Sound-Modifying Means for Talking-Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to characters of reference marked thereon, which form a part of this specification.

This invention has reference, generally, to improvements in talking machines and similar sound-reproducing machines, such as the graphophone and the phonograph; and, the present invention relates more particularly to a novel means for use with the usual sound-conveying member leading to the reproducing horn, said means being for the purposes of modifying the sounds and by means of the mechanism varying to any desired extent the degree of the reproduced sounds.

This invention therefore has for its principal object to provide a simply constructed and efficiently operating sound-modifying means for use with the sound-conveying tube or member of the various forms of talking machines, which is under perfect control of the operator and can be most easily worked, so that the sounds can be reproduced with modified effects, and especially is this so with the reproduction of musical sounds, as the singing of a person, or a piece played upon a musical instrument or instruments, the pianissimo and forte effects being most perfectly reproduced.

Other objects of this invention not at this time more particularly enumerated will be clearly understood from the following detailed description of my present invention.

The invention consists, primarily, in the novel sound-modifying device for use with talking machines of the various kinds; and the invention consists, furthermore, in the general arrangements and combinations of devices and parts, as well as in the details of the construction of the same, all of which will be hereinafter more fully described, and

then finally embodied in the clauses of the claims which are appended to and which form an essential part of this specification.

The invention is clearly illustrated in the accompanying drawings, in which:

Figure 1 is a side elevation of one form of talking machine and its sound-conveying tube or member leading to the sound-reproducing horn, a portion of which is shown in elevation, said view showing also in end-elevation the button or operating-member of the sound-modifying means used with said tube. Fig. 2 is an enlarged view of said sound-conveying tube or member, shown partly in plan and partly in horizontal section, with an end-portion of the sound-modifying means shown in top view. Fig. 3 is a horizontal sectional representation of the jointed elements of said sound-conveying tube or member, with the sound-modifying means shown in plan within the joint of said elements; and Fig. 4 is a horizontal section, made on an enlarged scale, of said jointed elements, and of the sound-modifying means arranged in said joint, showing one general arrangement of the parts comprising said sound-modifying means. Fig. 5 is a vertical section taken on line 5—5 in said Fig. 4, but made on a still larger scale, said section showing the sound-modifying means in its wide-open position within the jointed elements of the sound-conveying tube or member; and Figs. 6 and 7 are similar sectional representations of the same parts, but showing the sound-modifying means in two of its other positions for modifying the sound.

Similar characters of reference are employed in all of the above described views, to indicate corresponding parts.

Referring now more particularly to Figs. 1 to 7 inclusive, the reference-character 1 indicates one form of talking machine of the graphophone-type, and 2 is the usual suitable support connected with and extending in an upward direction from the casing or box of the machine, said support being provided with a supporting means, as 3, for the usual sound-reproducing horn 4. Extending from and rotatably connected with said supporting means 3 is the usual sound-conveying tubular member 5 which is provided at its end-portion 6 with a horizontally disposed tubular sleeve-like member 7, said member being

open at both ends and establishing communication with the inner tubular portion of the member 5. Arranged in an oscillatory manner within said horizontally disposed sleeve-like member 7 is the end bearing-portion 9 of another sound-conveying member or tube 8 which is formed with an annular projection or shoulder 10 bearing against the one end of said sleeve-like member 7, and said member or tube 8, which is usually curved, as shown, carrying at its other end a recorder 11 and stylus 12 adapted to be brought in contact with the usual form or record-disk 13, as will be clearly understood.

Referring now more particularly to Figs. 3 and 4 of the drawings, it will be seen that the free end-portion of the member or tube 8 which also rests in an oscillatory manner within the sleeve-like member 7 is provided in its side with an opening 14, so that an unobstructed passageway for the sound from the recorder through the tube 8 into the tube 5 and the horn 4 will be produced. The said member or tube 8 is also formed upon a portion of its inner surface with a screw-thread 15 for arranging and screwing the sound-modifying means or device, to be presently described, in its operative position within the joint formed by the said members or tubes.

The said sound-modifying device consists, essentially, of an element 16 which is provided with a tubular part 17 which is longitudinally divided, so as to provide a longitudinally extending open part, and is formed with an annular flange 18. The element 16 is of a cylindrical configuration, and is provided with a screw-thread 19, so as to be screwed into the screw-threaded end-portion of said sound conveying member or tube 8, the said flange 18 being used as a fingerpiece, and being adapted to be brought against the marginal ends of the tube or member 8 and the sleeve-like member 7, as shown in Figs. 3 and 4 of the drawings, to prevent the separation of the parts when operatively assembled. Loosely and revolvably arranged in said tubular part 17 of the element 16 is a stem or pin 20, said pin being provided with a knob or fingerpiece 21, formed with a portion 22 which bears upon the outer face 23 of said element 16, substantially as shown. The inner end-portion of said stem or pin 20 extends for some distance into the interior of the end-portion of said member or tube 8, and secured upon this end-portion of the stem or pin 20, by means of rivets 24, or any other suitable means of fastening, is a valve of such a construction that the opening 14 can be partially closed or entirely opened, substantially in the manner and for the purposes to be presently more fully described. The valve is usually made of suitable sheet-metal, having a spring-like action and it consists of a straight portion or member 25, bent as at 26, along one of its longitudinal edges,

and then terminating in a substantially semi-cylindrical part 27 of substantially the inner contour of the sleeve-like member 7. The reference-character 28 indicates a piece of felt, or other suitable fabric, which is secured upon the outer surfaces of the part 27, the part 26 and the straight member 25, by means of a cement, glue, or other suitable fastening material 29, substantially as illustrated in said Figs. 4 to 7 inclusive. The relative arrangements of the said parts, which have been shown exaggerated in the several figures of the drawings, is such that it will fit snugly in frictional contact with the inner surface of the sleeve-like member 7, but can be oscillated within said member 7 when the stem or pin 20 is operated by means of its knob or fingerpiece 21, as will be clearly evident from an inspection of Figs. 5, 6 and 7 of the drawings.

Having thus in a general manner set forth the construction of one form of sound-modifying means for the purposes of the present invention, its operation for enlarging or reducing the opening 14 in the sound-conveying duct, for producing sounds from the loudest and strongest degree to the faintest and weakest degree, or any intermediate degree will be clearly evident from the different relative positions at which the device can be set, three of such positions being represented in said Figs. 5, 6 and 7 of the drawings. It will also be understood, that during the performance of the talking-machine, the operator can constantly manipulate the device by means of the fingerpiece 21, so as to bring out different forte and pianissimo and crescendo effects, during the reproduction of a piece of music or the singing of a person, or for reproducing the different intonations of speech during the reproduction of a spoken piece.

From the foregoing description of my present invention it will be clearly seen that I have produced a simply constructed and most effectively operating sound-modifying device or means for use with the various classes of talking machines, and whereby the reproductions of musical and other numbers or pieces can be brought forth in a more exact imitation of the original rendition of the same upon a musical instrument, or by a person singing or talking.

Of course I am aware that various changes may be made in the devices, as well as in the arrangements and combinations of the parts, and the details of the construction of the same, without departing from the scope of my present invention, as set forth in the claims. Hence I do not limit my invention to the exact shape and construction of the sound-modifying devices herein described, nor do I confine myself to the exact arrangement and combinations of the parts, nor to the details of the construction of the

same, as set forth in the detailed description of my present invention.

I claim:—

1. In combination with a sound-conveying tube of a talking machine, a tubular sound-modifying means within said tube which is longitudinally divided, so as to provide a longitudinally extending open part.

2. In combination with a sound-conveying tube of a talking machine, an oscillatory tubular sound-modifying means within said tube which is longitudinally divided, so as to provide a longitudinally extending open part.

3. In combination with a flexible sound-conveying tube of a talking machine, a tubular sound-modifying means within said tube, which is longitudinally divided, so as to provide a longitudinally extending open part.

4. In combination with a flexible sound-conveying tube of a talking machine, an oscillatory tubular sound-modifying means within said tube which is longitudinally divided, so as to provide a longitudinally extending open part.

5. In combination with a sound-conveying tube of a talking machine, a tubular sound-modifying means within said tube which is longitudinally divided, so as to provide a longitudinally extending open part, and a finger-piece extending from said modifying means to a point upon the outside of the sound-conveying tube.

6. In combination with a sound-conveying tube of a talking machine, an oscillatory tubular sound-modifying means within said tube which is longitudinally divided, so as to provide a longitudinally extending open part, and a finger-piece extending from said modifying means to a point upon the outside of the sound-conveying tube for oscillating the said modifying means.

7. In combination with a flexible sound-conveying tube of a talking machine, a tubular sound-modifying means within said tube which is longitudinally divided, so as to provide a longitudinally extending open part, and a finger-piece extending from said modifying means to a point upon the outside of the sound-conveying tube.

8. In combination with a flexible sound-conveying tube of a talking machine, an oscillatory tubular sound-modifying means within said tube which is longitudinally divided, so as to provide a longitudinally extending open part, and a finger-piece extending from said modifying means to a point upon the outside of the sound-conveying tube for oscillating the said modifying means.

9. In combination with a sound-conveying tube of a talking machine, a sound-modifying means within said tube comprising an element arranged in said tube and provided with a tubular part, a stem rotatably arranged in the tubular part of said element,

said stem being provided upon one end with a finger-piece and having its other end-portion extending beyond said element and into said sound-conveying tube, and a valve-like member upon said end-portion of the stem.

10. In combination with a sound-conveying tube of a talking machine, a sound-modifying means within said tube comprising an element arranged in said tube and provided with a tubular part, a stem rotatably arranged in the tubular part of said element, said stem being provided upon one end with a finger-piece and having its other end-portion extending beyond said element and into said sound-conveying tube, and a valve-like member upon said end-portion of the stem, consisting of a straight-portion adapted to be secured upon said stem, and a curved spring-part extending from said straight-portion in slidable contact with the inner surface-portion of the sound-conveying tube.

11. In combination with a sound-conveying tube of a talking machine, a sound-modifying means within said tube comprising an element arranged in said tube and provided with a tubular part, a stem rotatably arranged in the tubular part of said element, said stem being provided upon one end with a finger-piece and having its other end-portion extending beyond said element and into said sound-conveying tube, and a valve-like member upon said end-portion of the stem, consisting of a straight-portion adapted to be secured upon said stem, and a curved spring-part extending from said straight-portion and a soft fabric secured upon said spring-part, said fabric being in slidable contact with the inner surface-portion of the sound-conveying tube, substantially as and for the purposes set forth.

12. In combination with a sound-conveying tube of a talking machine, said tube being provided with an internally screw-threaded portion, a sound-modifying means within said tube comprising a screw-threaded element adapted to be screwed into the screw-threaded portion of said sound-conveying tube, and said element being provided with a tubular part, a stem rotatably arranged in the tubular part of said element, said stem being provided upon one end with a finger-piece and having its other end-portion extending beyond said element and into said sound-conveying tube, and a valve-like member upon said end-portion of the stem.

13. In combination with a sound-conveying tube of a talking machine, said tube being provided with an internally screw-threaded portion, a sound-modifying means within said tube comprising a screw-threaded element adapted to be screwed into the screw-threaded portion of said sound-conveying tube, and said element being provided with a tubular part, a stem rotatably arranged in the tubular part of said element, said stem

being provided upon one end with a finger-piece and having its other end-portion extending beyond said element and into said sound - conveying tube, and a valve - like member upon said end-portion of the stem, consisting of a straight-portion adapted to be secured upon said stem, and a curved spring-part extending from said straight-portion in slidable contact with the inner surface-portion of the sound conveying tube.

14. In combination with a sound-conveying tube of a talking machine, said tube being provided with an internally screw-threaded portion, a sound-modifying means within said tube comprising a screw-threaded element adapted to be screwed into the screw-threaded portion of said sound-conveying tube, and said element being provided with a tubular part, a stem rotatably arranged in the tubular part of said element, said stem being provided upon one end with a finger-piece and having its other end-portion extending beyond said element and into said sound - conveying tube, and a valve - like member upon said end-portion of the stem, consisting of a straight-portion adapted to be secured upon said stem, and a curved spring-part extending from said straight-portion, and a soft fabric secured upon said spring-part, said fabric being in slidable contact with the inner surface-portion of the sound-conveying tube, substantially as and for the purposes set forth.

15. In combination with a sound-conveying tube of a talking machine, comprising a pair of flexibly connected tubular members, one of said members being arranged within the other member and being provided with a retaining shoulder and having an internally screw-threaded portion, a sound-modifying means within said inner member, said modifying means comprising a screw-threaded element adapted to be screwed into the screw-threaded portion of said inner member, and said element being provided with a tubular part, a stem rotatably arranged in the tubular part of said element, said stem being provided upon one end with a finger-piece and having its other end-portion extending beyond said element and into said sound - conveying tube, and a valve - like member upon said end-portion of the stem.

16. In combination with a sound-conveying tube of a talking machine, comprising a pair of flexibly connected tubular members,

one of said members being arranged within the other member and being provided with a retaining shoulder and having an internally screw-threaded portion, a sound-modifying means within the inner member, said modifying means comprising a screw-threaded element adapted to be screwed into the screw-threaded portion of said inner member, and said element being provided with a tubular part, a stem rotatably arranged in the tubular part of said element, said stem being provided upon one end with a finger-piece and having its other end-portion extending beyond said element and into said sound - conveying tube, and a valve - like member upon said end-portion of the stem, consisting of a straight-portion adapted to be secured upon said stem, and a curved-spring-part extending from said straight-portion in slidable contact with the inner surface-portion of the sound conveying tube.

17. In combination with a sound-conveying tube of a talking machine, comprising a pair of flexibly connected tubular members, one of said members being arranged within the other member and being provided with a retaining shoulder and having an internally screw-threaded portion, a sound-modifying means within the inner member, said modifying means comprising a screw-threaded element adapted to be screwed into the screw-threaded portion of said inner member, and said element being provided with a tubular part, a stem rotatably arranged in the tubular part of said element, said stem being provided upon one end with a finger-piece and having its other end-portion extending beyond said element and into said sound - conveying tube, and a valve - like member upon said end-portion of the stem, consisting of a straight-portion adapted to be secured upon said stem, and a curved spring-part extending from said straight-portion and a soft fabric secured upon said spring-part, said fabric being in slidable contact with the inner surface-portion of the sound-conveying tube, substantially as and for the purposes set forth.

In testimony, that I claim the invention set forth above I have hereunto set my hand this 29th day of October, 1907.

ELLIS S. OLIVER.

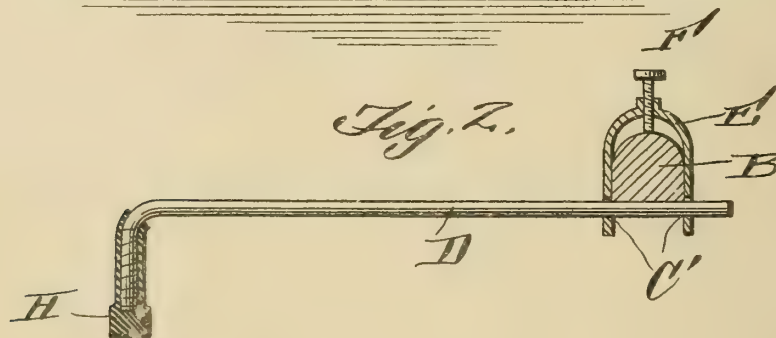
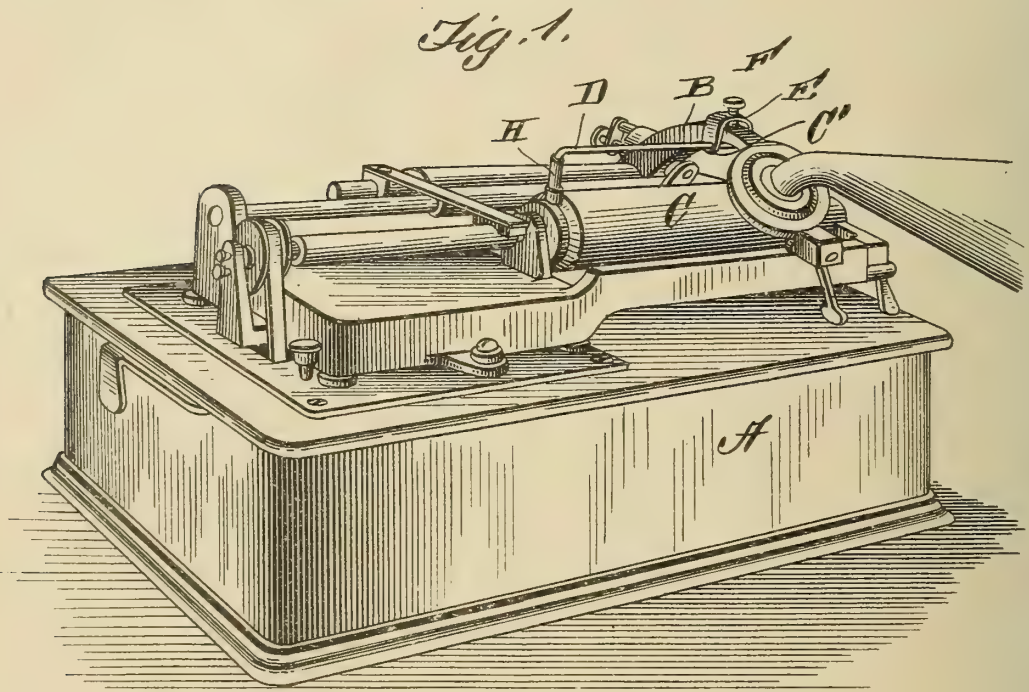
Witnesses:

FREDK. C. FRAENTZEL,
ANNA H. ALTER.

C. A. RUMBLE.
 AUTOMATIC STOP FOR PHONOGRAPHS.
 APPLICATION FILED AUG. 4, 1908.

932,061.

Patented Aug. 24, 1909.



Witnesses

R. H. Joswell.
Arthur Smith

By

Inventor
Charles A. Rumble
a. L. Hough
 Attorney

UNITED STATES PATENT OFFICE.

CHARLES A. RUMBLE, OF LOWVILLE, NEW YORK.

AUTOMATIC STOP FOR PHONOGRAPHS.

932,061.

Specification of Letters Patent. Patented Aug. 24, 1909.

Application filed August 4, 1908. Serial No. 446,904.

To all whom it may concern:

Be it known that I, CHARLES A. RUMBLE, a citizen of the United States, residing at Lowville, in the county of Lewis and State of New York, have invented certain new and useful Improvements in Automatic Stops for Phonographs; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to new and useful improvements in means for stopping sound reproducing machines when a record has been played and consists of a clip secured to the reproducer arm and carrying an angled rod which is clamped by means of a set screw upon the clip against the reproducer arm and held in an adjusted position, the angled end of the rod being adapted to be positioned in the path of the record.

The invention comprises various details of construction, combinations and arrangements of parts which will be hereinafter fully described and then specifically defined in the appended claims.

I illustrate my invention in the accompanying drawings, in which:—

Figure 1 is a perspective view of a phonograph showing my invention as applied thereto, the device being shown in the position it assumes when it automatically stops the phonograph. Fig. 2 is a sectional view through the reproducer arm showing the stopping device in side elevation, and Fig. 3 is a detail perspective view of the device and a clip for holding the same upon the reproducer arm.

Reference now being had to the details of the drawings by letter, A designates a casing of a sound reproducing or talking machine, B a reproducer arm, and C the record mounted upon the usual cylinder.

D designates an angled rod, the shank portion of which passes through apertures C in the clip E which has a threaded aperture for the reception of an adjusting screw F. The angled end of said rod is preferably provided with a buffer H in order that the end of the

rod will not injure the record against which it might come in contact. Said clip is fitted over the reproducer arm in the manner shown in Figs. 1 and 2 of the drawings and, by tightening the screw, the rod will be drawn frictionally against the under edge of the arm to hold the rod in a fixed position. The angled end of the rod is mounted as shown so that the end of the buffer, when the reproducer arm is at its farthest limit in one direction to the right, will contact with the end of the record with sufficient frictional force to cause the machine to stop. By means of the screw F, said rod may be nicely adjusted so that the machine will come to a stop immediately as soon as the record has played through.

Owing to the simplicity of my invention, it may be readily attached to various forms of sound reproducing or talking machines, such as phonographs, graphophones, etc., without any special appliances.

What I claim to be new is:—

1. In combination with a reproducer arm of a talking machine, an inverted U-shaped clip adapted to straddle said arm and provided with registering apertures adjacent to its ends, an angled rod passing through said apertures underneath the arm, and a screw carried by said arm and adapted to frictionally engage said arm to hold the rod in an adjusted position.

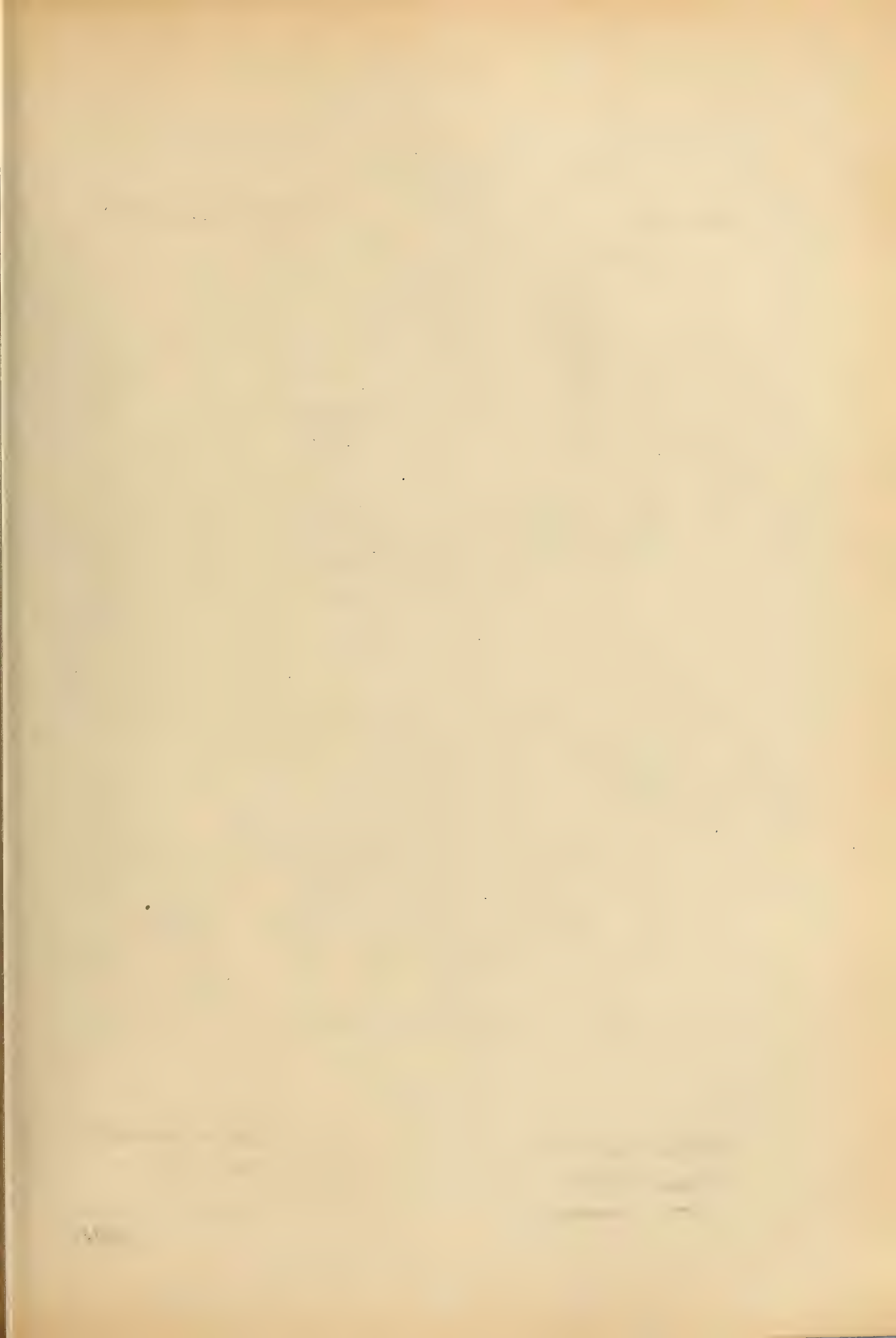
2. In combination with the reproducer arm of a talking machine, an inverted U-shaped clip adapted to straddle said arm and provided with registering apertures adjacent to the ends thereof, a threaded aperture at the longitudinal center of the clip, an adjusting screw mounted in said threaded aperture and adapted to bear against the arm, an adjustable stop rod having an angled end, the shank portion of said rod passing through said registering apertures and adapted to frictionally engage the under edge of the reproducer arm as said screw is tightened.

In testimony whereof I hereunto affix my signature in presence of two witnesses.

CHARLES A. RUMBLE.

Witnesses:

ANNA RUMBLE,
F. N. LASON.



P. WEBER.
PHONOGRAPH.

APPLICATION FILED JAN. 20, 1908.

932,200.

Patented Aug. 24, 1909.

Fig. 1

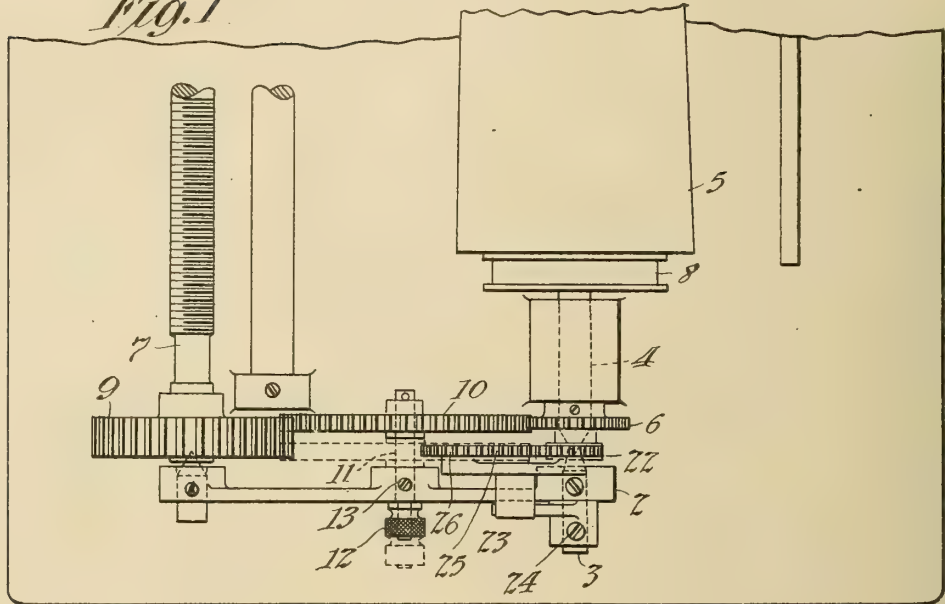
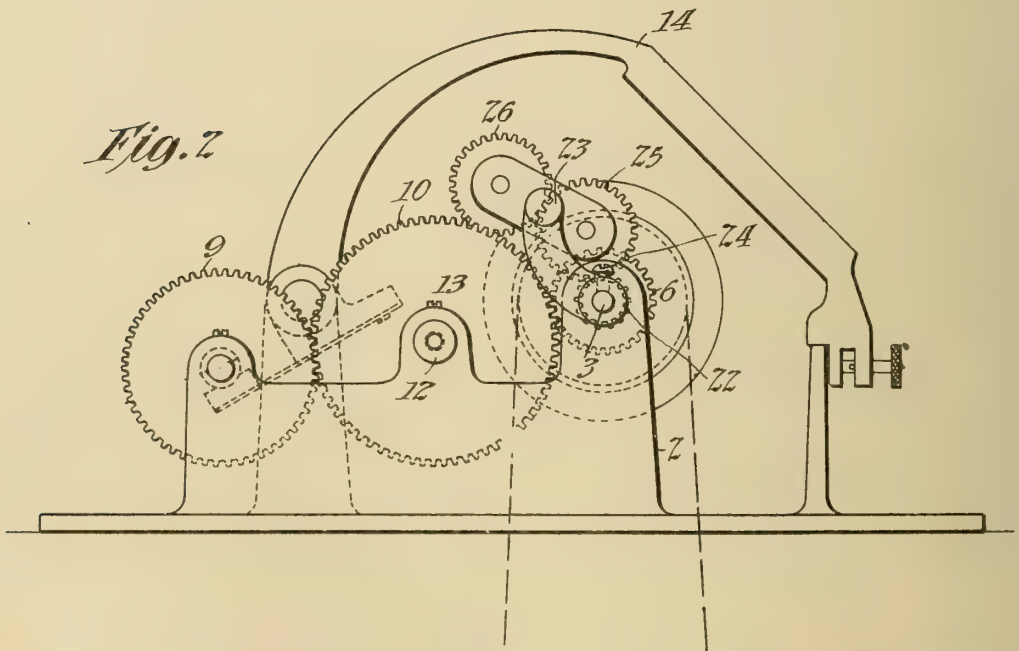


Fig. 2



Witnesses:
Frank D. Myers
De los Holden

Inventor:
Peter Weber
by Frank L. Myers
Atty.

UNITED STATES PATENT OFFICE.

PETER WEBER, OF ORANGE, NEW JERSEY, ASSIGNOR TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

PHONOGRAPH.

932,200.

Specification of Letters Patent.

Patented Aug. 24, 1909.

Application filed January 20, 1908. Serial No. 411,829.

To all whom it may concern:

Be it known that I, PETER WEBER, a citizen of the United States, and a resident of Orange, in the county of Essex and State of New Jersey, have made certain new and useful Improvements in Phonographs, of which the following is a description.

My invention relates to a phonograph having interchangeable means for changing the relative speed of the feed screw with respect to the mandrel in a definite ratio so as to adapt the phonograph, when provided with the ordinary sound box carrier driven from the feed screw in the usual manner, to operate upon phonograph sound records having either one hundred or two hundred threads to the inch, or sound records bearing any other definite relation to each other as regards the pitch thereof.

It comprises improved means for gearing together the mandrel and feed screw shaft, so that the relative speeds thereof may be varied by a very simple change of gearing, the change gearing being added to the frame of an existing phonograph adapted to operate upon records having one hundred threads to the inch or any other single definite gear ratio between the mandrel and the feed screw shaft, the frame and other existing elements of the existing machine being changed by my invention as little as possible.

The invention consists of the features hereinafter set forth and claimed.

Reference is hereby made to the accompanying drawings of which—

Figure 1 is a plan view of a phonograph of well-known form to which my invention is applied and Fig. 2 is an end elevation of the same.

Corresponding parts are designated by the same reference numerals in both views.

The phonograph shown comprises a base or body 1, formed with an upright 2 upon which is rotatably supported the shaft 4 carrying the mandrel 5, to which is secured a drive pulley 8 adapted to receive the belt from the phonograph motor. The feed screw shaft 7 is also rotatably supported and is provided with a spur gear 9 fixed thereto and formed with gear teeth of considerable width, as shown. A spur gear 10 is rotatably mounted upon a longitudinally movable pin 11, said pin being provided with a head 12, and being supported in an opening formed

in the upright 2, in which it may be secured by a set screw 13. A pair of spur gears 6 and 22 are fixed to the mandrel shaft 4, and there is a frame or support 23 which carries a pair of rotatable spur gears 25 and 26 which mesh with each other, and the former of which meshes with the gear 22. The frame 23 is preferably sleeved upon the projecting end of the pivot pin or center 3 which supports the end of the shaft 4, and said frame is fixed to said pin in any suitable manner, as by set screw 24.

When the parts are in the positions shown in full lines, Fig. 1, the feed screw shaft 7 is driven from the mandrel shaft 4 through the gears 6, 10 and 9, and these gears are so proportioned that the speed of the feed screw shaft will be suitable for feeding the sound box carriage 14 at a suitable speed for operating upon sound records having one hundred threads to the inch. Upon loosening the set screw 13, the pin 11 carrying the gear 10 may be moved from the position shown in full lines, Fig. 1, to the position shown in dotted lines, in which position the gear 10 will remain in engagement with the gear 9, but will be brought out of engagement with the gear 6 and into engagement with the gear 26, and the feed screw shaft will then be driven from the mandrel shaft through the gears 22, 25, 26, 10 and 9, and these gears are so proportioned that the speed imparted to the feed screw shaft will be suitable for operatively feeding the carriage 14 with respect to a sound record having two hundred threads to the inch. The pin 11 may be held in this position by the set screw 13.

It will be noted that the frame of the existing phonograph is made use of unchanged, except that the prolonged sliding stud 11 carrying sliding intermediate gear 10 is made use of in place of the short fixed stud carrying the intermediate gear in the usual thread machine. Also, the wide toothed gear 9 of the feed screw shaft is substituted for the narrow gear usual in the ordinary construction, and the prolonged center 3 for the mandrel shaft 4 is substituted for the ordinary short center usual in this location. Also, two gears 6 and 22 are placed on the mandrel shaft instead of the usual single gear. On the prolongation of the center 3 the frame carrying the gears 25 and 26 is sleeved, as above described.

Having now described my invention, what I claim is:

1 In a phonograph, the combination with
the rotary mandrel and feed screw shafts, of
5 an upright carrying centers supporting one
end of each of the same, a wide toothed gear
fixed to one of said shafts, a pair of gears
fixed to the other of said shafts, a stud ex-
tending through said upright and slidable
10 therein, a gear thereon meshing with said
wide toothed gear and movable into and out
of driving relation to each of said fixed gears
while remaining in mesh with said wide
toothed gear, substantially as described.
15 2. In a phonograph, the combination with
the rotary mandrel and feed screw shafts, of
an upright carrying centers supporting one
end of each of the same, a wide toothed gear
fixed to one of said shafts, a pair of gears
20 fixed to the other of said shafts, a stud ex-
tending through said upright and slidable
therein, the center for supporting the end of
the shaft carrying the pair of fixed gears be-
ing prolonged beyond the upright, a support
25 attached to the prolongation thereof, a gear
train carried thereby meshing with one of
said fixed gears, and a gear on said slidable
stud meshing continuously with said wide

toothed gear and interchangeably with the
other of said fixed gears and with the gear 30
train, substantially as described.

3. In a phonograph, the combination with
the rotary mandrel and feed screw shafts, of
an upright carrying centers supporting one
end of each of the same, a wide toothed gear 35
fixed to one of said shafts, a pair of gears
fixed to the other of said shafts, a stud ex-
tending through said upright and slidable
therein, the center for supporting the end of
the shaft carrying the pair of fixed gears be- 40
ing prolonged beyond the upright, a support
sleeved to the prolongation thereof, a gear
train carried thereby meshing with one of
said fixed gears, and a gear on said slidable
stud meshing continuously with said wide 45
toothed gear and interchangeably with the
other of said fixed gears and with the gear
train, and means for securing the slidable
stud and the sleeved support in any desired
position, substantially as described. 50

This specification signed and witnessed
this 13 day of Jan. 1908.

PETER WEBER.

Witnesses:

FRANK D. LEWIS,
H. H. DYKE.

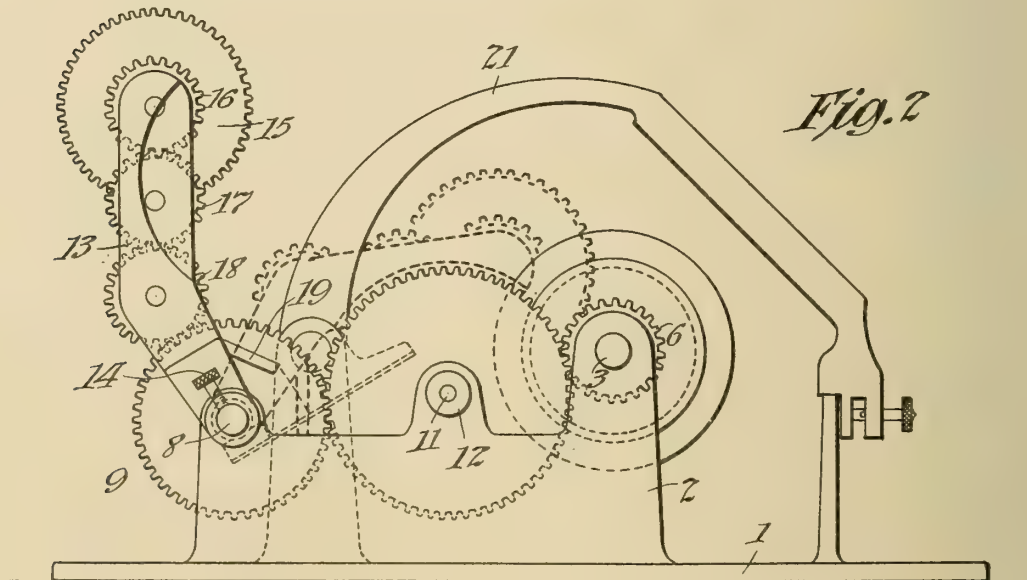
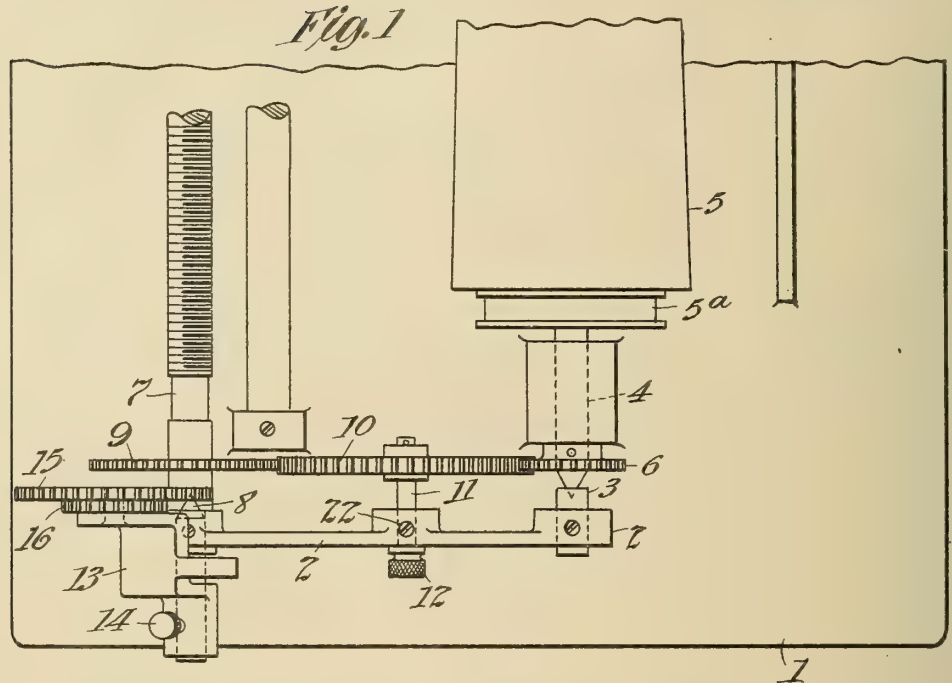
P. WEBER.
PHONOGRAPH.

APPLICATION FILED JAN. 20, 1908.

932,201.

Patented Aug. 24, 1909.

2 SHEETS—SHEET 1.



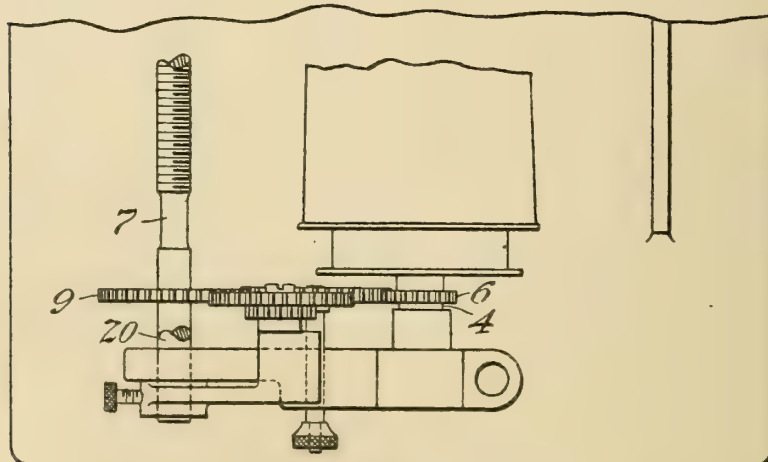
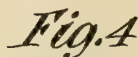
Witnesses:
Frank D. Lewis
Delos Holden

Inventor:
P. Weber
by Frank L. Brown
Atty.

APPLICATION FILED JAN. 20, 1908.

Patented Aug. 24, 1909.

2 SHEETS—SHEET 2.



Inventor:
Peter Weber

by Frank L. Owen
Atty.

UNITED STATES PATENT OFFICE.

PETER WEBER, OF ORANGE, NEW JERSEY, ASSIGNOR TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

PHONOGRAPH.

932,201.

Specification of Letters Patent.

Patented Aug. 24, 1909.

Application filed January 20, 1908. Serial No. 411,830.

To all whom it may concern:

Be it known that I, PETER WEBER, a citizen of the United States, and a resident of Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Phonographs, of which the following is a description.

My invention relates to phonographs of the type wherein the sound box is carried on a traveling carriage to which a progressive movement is imparted by means of a rotating feed screw, so that the reproducer or recorder stylus traces a spiral path with respect to the record surface. It has been the usual practice for many years to provide a feed screw of fine pitch which will advance the traveling carriage a distance of one one-hundredth of an inch for each revolution of the mandrel. More recently, however, it has been found possible to manufacture a sound record in which the record groove has two hundred turns or threads to the inch, so that it is desirable to provide a phonograph in which the feed of the carriage will be suitable for operating upon a record of this description. In view of the fact, however, that there are already thousands of phonographs in use in which the feed screw advances the carriage one one-hundredth of an inch per mandrel revolution, and a vast number of records are also in use having a pitch of one one-hundredth of an inch, it is desirable to provide means which may readily be applied to such phonographs whereby the feed screw may be driven at one-half the speed at which it has been heretofore driven, such means also permitting the driving of the feed screw at its usual speed, so that the phonograph can be used interchangeably with sound records having either one hundred or two hundred threads per inch, and my invention has for its object the provision of interchangeable means of this character which may be readily applied to a phonograph and in which, when so applied, the parts may be readily shifted with respect to each other, so as to drive the feed screw at the desired rate of speed.

Reference is hereby made to the accompanying drawings, of which —

Figure 1 is a plan view showing a portion of a phonograph constructed in accordance with my invention; Fig. 2, is a side elevation of the same, and Figs. 3 and 4 are similar views illustrating a modification.

The phonograph shown in Figs. 1 and 2 is of a well-known form and comprises a base 1, formed with an upright 2 having a center 3 which supports one end of the mandrel shaft 4, which carries the mandrel 5. A drive pulley 5^a is secured to the shaft 4, and is adapted to receive the driving belt from the motor. A drive gear 6 is fixed to the shaft 4. Parallel to the mandrel shaft 4 and in the rear thereof is the feed screw 65 shaft 7, one end of which is supported upon the pivot pin or center 8, carried by the upright 2. A gear 9 is fixed to the shaft 7 and is adapted to be driven by a gear 10 rotatably mounted on a movable pin 11 which is supported in a boss formed on the upright 2. The gear 10, when in the position of Fig. 1, is in engagement with the gears 6 and 9, and the shaft 7 is driven from the shaft 4 through the gears 6, 10 and 9 which are proportioned for driving the shaft 7 and feeding the sound box carriage 21 at the proper speed for operating upon a sound record, the pitch of which is one one-hundredth of an inch. The pin 11 is provided with a knob or head 12 for moving the same longitudinally thereby removing the gear 10 from engagement with the gears 6 and 9. A set screw 22 may be provided for holding the pin 11 in any desired position.

In order that the shaft 7 may be driven at a speed suitable for operating upon a record having two hundred threads per inch, I provide a frame or support 13 which is mounted upon the end of the pin 8 which projects beyond the upright 2, said frame being angularly adjustable upon said pin and adapted to be clamped in a fixed position by means of a set screw 14. This frame carries a gear train composed of spur gears 15, 16, 17 and 18. The frame 13 may be moved in a direction parallel with the axis of the shaft 7 so as to bring the gear 18 into and out of engagement with the gear 9. When the gear 10 is in the position of Fig. 1 for driving the shaft 7 at a speed for operating upon records having one hundred threads to the inch, the frame 13 will preferably occupy the position shown in Figs. 1 and 2, although, of course, it could occupy a position in which the gear 18 engages the gear 9, provided the gear 15 is not in engagement with the gear 6. In this case, however, the gears carried by the frame 13 would be driven as idlers, thus introducing

unnecessary friction. When the frame 13 is adjusted upon the pin 8 from the position shown in full lines, Fig. 2, to the position indicated in dotted lines, the gear 15 will be brought into engagement with the driving gear 6, and the gear 10 having been moved out of engagement therewith, the shaft 7 will be driven through the gear train 6, 15, 16, 17, 18 and 9, and these gears are so proportioned that the speed of the shaft 7 will be suitable for feeding the sound box carriage with respect to a sound-record having two hundred threads per inch. All that is necessary to convert the machine into one suitable for a record of one hundred threads to the inch is to move the frame 13 into the position shown in the drawing, securing it by the set screw 14, and then move the gear 10 into the position shown, which operation can be readily understood and performed by the ordinary user of a phonograph. The frame 13 is preferably provided with a projecting foot 19 which is adapted to rest upon the upper edge of the upright 2 when the frame 13 is in the position shown in dotted lines, Fig. 2, thereby supporting the frame 13 in its operative position.

The phonograph shown in Figs. 3 and 4 is similar in its general features to that of Figs. 1 and 2. The guide rod 20 in the machine of Figs. 3 and 4 is situated above the shaft 7, and upon its outer end may be secured the frame 13', which is similar to the frame 13 and which carries the gear train 15, 16, 17 and 18 adapted to operatively connect the gears 6 and 9 carried by the shafts 4 and 7. The frame 13' has a foot 19' adapted to rest upon the upright 2, and a set screw 14 is provided for holding the frame 13' in its inoperative position as shown in full lines, Fig. 4. In this position the gear 18 will necessarily be out of engagement with the gear 9, and it is therefore unnecessary to move the frame 13' in a direction parallel to the axis of the shaft 7. In all other respects the device of Figs. 3 and 4 is the same as that of Figs. 1 and 2.

It will be noted that in my invention the frame of an existing type of phonograph is made use of unchanged, the only changes which must be made to the same to adapt the machine to operate on one hundred and two hundred thread records interchangeably, being the substitution of the sliding stud 11 for the fixed stud for carrying the intermediate gear 10 of the existing gear train between the mandrel shaft and the feed screw shaft, this stud 11, of course, being lengthened, and the substitution of the prolonged center 8 for the feed screw shaft for the short center for the feed screw shaft found in the existing one hundred thread machine. On the prolongation of the center 8 is placed the supporting frame 13 carrying the gear train as above described.

Having now described my invention, what I claim is:

1. In a phonograph, the combination of the mandrel and feed screw shafts having gears fixed thereto, of an upright carrying centers supporting one end of each of the same, one of said centers being prolonged, a support pivotally mounted on the prolongation of said center, said support carrying intermeshing gears adapted to be moved into and out of engagement with said fixed gears, substantially as described.

2. In a phonograph, the combination of the mandrel and feed screw shafts having gears fixed thereto, of an upright carrying centers supporting one end of each of the same, one of said centers being prolonged, a support pivotally mounted on the prolongation of said center, said support carrying intermeshing gears adapted to be moved into and out of engagement with said fixed gears, and means for clamping said support in fixed position, substantially as described.

3. In a phonograph, the combination of the mandrel and feed screw shafts having gears fixed thereto, of an upright carrying centers supporting one end of each of the same, one of said centers being prolonged, a support pivotally mounted on the prolongation of said center, gear means carried thereby, and so positioned that a pivotal movement of said support throws the said gear means into or out of engagement with said fixed gears to connect or disconnect the same, substantially as described.

4. In a phonograph, the combination of the mandrel and feed screw shafts having gears fixed thereto, of an upright carrying centers supporting one end of each of the same, one of said centers being prolonged, a support pivotally mounted on the prolongation of said center, gear means carried thereby, and so positioned that a pivotal movement of said support throws the said gear means into or out of engagement with said fixed gears to connect or disconnect the same, a frame, and a projection on said pivoted support adapted to contact said frame when said support is in position to interconnect said fixed gears, substantially as described.

5. In a phonograph, the combination of the mandrel and feed screw shafts having gears fixed thereto, of an upright carrying centers supporting one end of each of the same, one of said centers being prolonged, a support pivotally mounted on the prolongation of said center, gear means carried thereby, and so positioned that a pivotal movement of said support throws the said gear means into or out of engagement with said fixed gears to connect or disconnect the same, and other gear means movable into and out of mesh with said fixed gears when said pivotal support is in inoperative position, to drive one of said fixed gears from the

other at a different ratio from that given by the gear means of the pivotal support, substantially as described.

5 6. In a phonograph, the combination of
the mandrel and feed screw shafts having
gears fixed thereto, of an upright carrying
centers supporting one end of each of the
same, one of said centers being prolonged, a
support pivotally mounted on the prolonga-
10 tion of said center, gear means carried there-
by, and so positioned that a pivotal move-
ment of said support throws the said gear
means into or out of engagement with said
fixed gears to connect or disconnect the
15 same, and other gear means movable axially
of said shafts, when said pivotal support is in
inoperative position, to drive one of said
fixed gears from the other at a different ratio
from that given by the gear means of the piv-
20 otal support, substantially as described.

7. In a phonograph, the combination of
the mandrel and feed screw shafts having
gears fixed thereto, and a frame carrying
gear means adapted to interconnect said

fixed gears, said frame being mounted to be 25
movable angularly and in a direction paral-
lel to said shafts to interconnect or discon-
nect said fixed gears, substantially as de-
scribed.

8. In a phonograph, the combination of 30
the mandrel and feed screw shafts having
gears fixed thereto, and a frame carrying
gear means adapted to interconnect said
fixed gears, said frame being mounted to be
movable angularly and in a direction paral- 35
lel to said shafts to interconnect or discon-
nect said fixed gears, and other gear means
also movable into and out of mesh with said
fixed gears to interconnect the same with a
different gear ratio, substantially as de- 40
scribed.

This specification signed and witnessed
this 13 day of Jan. 1908.

PETER WEBER.

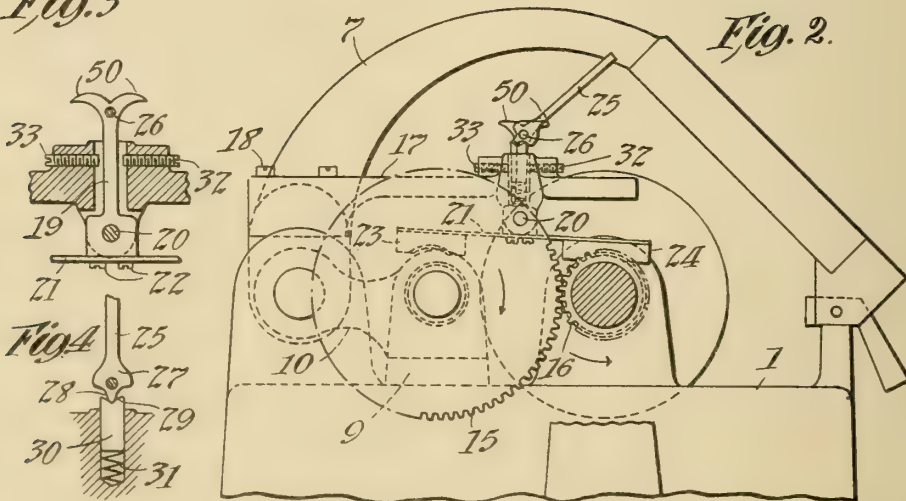
Witnesses:

FRANK D. LEWIS,
H. H. DYKE.

APPLICATION FILED JAN. 29, 1908.

Patented Aug. 24, 1909.

Fig. 2.



Frank D. Lewis
Herbert H. Dyke

Peter Nelson
by Frank L. Sperry
Atty.

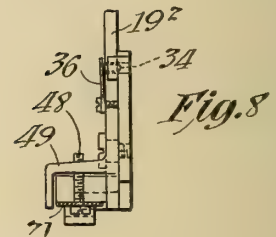
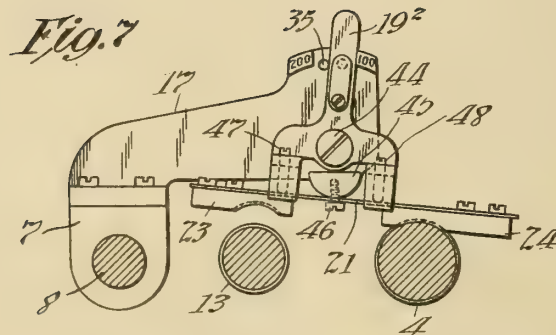
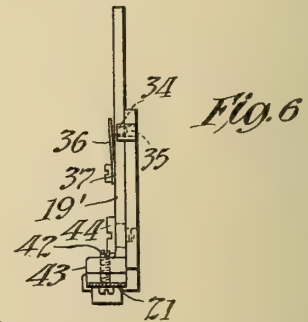
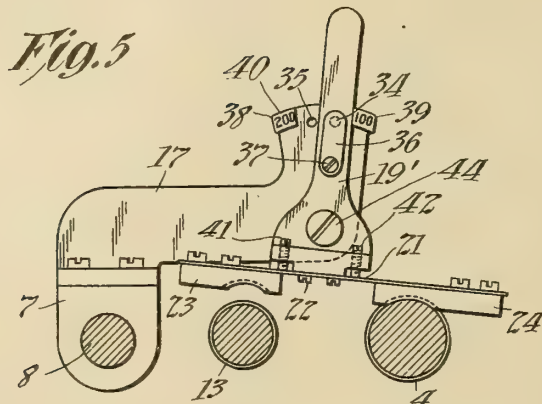
P. WEBER.
PHONOGRAPH.

APPLICATION FILED JAN. 29, 1908.

932,202.

Patented Aug. 24, 1909.

2 SHEETS—SHEET 2.



Witnesses:
Frank D. Lewis
Herbert H. Dyke

Inventor:
Peter Weber
by Frank L. Dyke
Atty.

UNITED STATES PATENT OFFICE.

PETER WEBER, OF ORANGE, NEW JERSEY, ASSIGNOR TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

PHONOGRAPH.

932,202.

Specification of Letters Patent.

Patented Aug. 24, 1909.

Application filed January 29, 1908. Serial No. 413,156.

To all whom it may concern:

Be it known that I, PETER WEBER, a citizen of the United States, and a resident of Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Phonographs, of which the following is a specification.

My invention relates to phonographs of the type wherein the sound box is carried on a traveling carriage, to which a progressive movement is imparted by means of a rotating feed screw, so that the reproducer or recorder stylus traces a spiral path with respect to the record surface.

It has been the usual practice for many years to provide a feed screw of fine pitch which advances the traveling carriage a distance of one one-hundredth of an inch for each revolution of the mandrel. More recently, however, it has been found possible to manufacture a sound record in which the record groove has two hundred turns or threads to the inch, so that it is desirable to provide a phonograph in which the feed of the carriage will be suitable for operating a record of this description. In view of the fact, however, that there are already thousands of phonographs in use in which the feed screw advances the carriage one one-hundredth of an inch per mandrel revolution, and a vast number of records are also in use having a pitch of one one-hundredth of an inch, it is desirable to provide means which may be readily applied to such phonographs whereby the carriage may be fed at a rate suitable for operating upon records having two hundred threads to the inch, and which will also permit the feeding of the carriage at its usual speed for operating upon records having one hundred threads to the inch, so that the phonograph can be used interchangeably with sound records having either one hundred or two hundred threads to the inch.

My invention has for its object the provision of interchangeable means of this character which comprises an extra or auxiliary feed screw which may be readily applied to the present type of phonograph, and means which may also be readily applied, whereby the sound box carriage may be operatively connected with each of the feed screws and fed at either of the desired speeds, and by which the operative connection of the traveling carriage may be readily shifted from one

feed screw to the other, indicating means being preferably provided in connection with the means for shifting the said connection, for indicating the rate at which the carriage is being fed, or, in other words, the type of record with which the phonograph is operative in either of the positions which the said shifting means occupies.

Reference is hereby made to the accompanying drawing, of which—

Figure 1 is a plan view of a portion of a phonograph to which one form of my invention is applied; Fig. 2 is an end view of the same, partly in section; Fig. 3 is a detail side view of a portion of the mechanism for shifting the operative connection of the traveling carriage from one feed screw to the other; Fig. 4 is a similar view showing another detail of said mechanism; Figs. 5 and 6 are side and edge views of a modified form of operating connection between the traveling carriage and the two feed screws, and Figs. 7 and 8 are similar views of another modification.

In all of the views corresponding parts are designated by the same numerals of reference.

The phonograph shown is of well-known form and comprises a base 1, to which is secured a pivot pin or center 2, which rotatably supports the end of the usual main shaft 3 which is provided with a feed screw 4, ordinarily formed with one hundred threads to the inch and which carries the mandrel 5, said shaft 3 being also provided with a drive pulley 6 which receives the belt from the phonograph motor. The traveling carriage 7, which carries the sound box, is sleeved upon a rod 8 rigid with the base 1. An auxiliary frame 9 is provided, which has a pair of rearwardly extending arms 10 and 11, which are sleeved upon the rod 8 and secured thereto in any suitable manner, as by a set screw 12. The auxiliary feed screw 13 is formed upon the shaft 14 which is rotatably mounted in the frame 9, and is provided at one end with a spur gear 15 fixed thereto and in engagement with a similar gear 16 fixed to the shaft 3 or pulley 6. The thread of the screw 13 extends in a direction opposite to that of the thread of the screw 4, since the two screws revolve in opposite directions. The gears 15 and 16 are so proportioned with respect to the thread of the screw 13 that the latter will impart to the traveling carriage a progressive movement

suitable for operating upon a record having two hundred threads per inch.

In order that the traveling carriage 7 may be operatively and interchangeably connected with each of the feed screws 4 and 13, an arm 17 is secured at its rear end by screws 18 to the carriage and carries at its forward end a vertical lever 19 pivoted at 20 to the said arm, and a flat spring 21 is secured thereto in any suitable manner, as by screws 22. Said spring carries at its ends the feed nuts 23 and 24, the former being adapted to engage the thread of the screw 13 and the latter the thread of the screw 4, the movement of the lever 19 in a forward direction serving to bring the nut 24 into engagement with the screw 4, at the same time removing the nut 23 from engagement with the screw 13, and vice versa, a rearward movement of the lever 19 removes the nut 24 from engagement with the screw 4 and brings the nut 23 into engagement with the screw 13. Suitable means for operating said lever 19 are preferably provided, and as shown comprise an operating lever 25 which is pivoted at 26 to the upper end of the lever 19, the lever 25 being formed with a pair of arms 27 which embrace the upper end of the lever 19, and receive the pivot pin 26. The lower ends of the arms 27 are shaped as shown in Figs. 2 and 4, forming cam surfaces 28, which engage the curved surfaces 29 formed in the upper ends of vertical pins 30, which occupy vertical recesses formed in the arm 17, said pins 30 being pressed in an upward direction by spiral springs 31 placed in the bottom of said recesses and engaging the lower ends of said pins. The springs 31 tend to throw the lever 25 from a central position toward either the right or left, Fig. 2; that is, when the lever 25 is moved either to the right or left of the vertical line, the pins 30 actuated by the springs 31 throw the lever 25 to either of its extreme positions as determined by the front or rear stops which, as shown, are in the form of screws 32 and 33, which are threaded in the enlarged portion of the arm 17, in such a position as to limit the movement of the vertical lever 19.

The parts are preferably so arranged that the spring 21 will be under a slight stress in either of its operative positions, whereby the feed nuts 23 and 24 will be yieldingly applied to their respective feed screws. The degree of pressure of the feed nuts upon their respective screws may be varied by adjustment of the screws 32 and 33. The movement of the lever 25 beyond the position of Fig. 2 is prevented by its engagement with one of the ears 50 formed on the upper end of the lever 19.

In the device of Figs. 5 and 6, the arm 17 is somewhat altered in shape, and is provided with a vertical lever 19', which is pivoted upon a screw 44 which is threaded in the arm

17. The spring 21, which carries the feed nuts 23 and 24 is rigidly secured to the flange 43 of lever 19' by the screws 22. The lever 19' is adapted to be operated by hand and to be locked in either its forward or rear position by engagement of a locking pin 34 with holes or depressions 35 formed in the arm 17, said pin 34 being secured to the free end of a spring 36 which is secured to the lever 19' by a screw 37. The arm 17 is formed with stops, for limiting the movement of the lever 19' in both directions, in the form of lugs 38 and 39, to which figures 40 may be applied to indicate the number of threads per inch of the phonograph record upon which the phonograph is adapted to operate when the lever 19' is in position adjacent either of said indicia. The various parts are so designed that the weight of the carriage will impart the desired pressure for each of the feed nuts upon its coöperating feed screw, and said pressure may be regulated or adjusted to any desired degree by means of adjusting screws 41 and 42 respectively which are threaded in the laterally extending flange 43 of the lever 19', in such position that the lower end of each of said screws presses against the upper surface of the spring 21.

In the device of Figs. 7 and 8, the spring 21 which carries the feed nuts 23 and 24, is loosely attached to a rounded lug 45, formed integral with the arm 17, by means of a screw 46 threaded in said lug and passing through a hole in said spring, the diameter of which is somewhat greater than that of the screw to permit the spring to move freely thereupon. The operating lever 19² is pivoted upon the screw 44 carried by the arm 17 and said lever is provided with a pair of screws 47 and 48, which are threaded within the angular arms 49 formed integral with the lever 19², and extending laterally therefrom, said screws 47 and 48 being so situated that their lower ends abut against the upper surface of the spring 21, for pressing either of the nuts 23 and 24 into engagement with the feed screws 13 and 4. The screws 47 and 48 are vertically adjustable for imparting the desired degree of pressure to the spring 21 by virtue of the weight of the traveling carriage. The spring 21 is situated between the extremities of the arms 49 and the main body of the lever, so that a lateral shifting of said spring cannot take place. The lever 19² is also provided with a spring 36 having a pin 34 for engaging the openings 35 of the arm 17 for locking the lever in either of its operative positions.

Having now described my invention, what I claim is:

1. In a phonograph, the combination with the rotating mandrel and traveling carriage, of a pair of rotating feed screws and means for interchangeably connecting said traveling carriage with said feed screws, said means

comprising pivoted hand lever means movable to one side or the other of the vertical for connecting the carriage to one or the other of said screws, said screws being of such pitch and rotating at such speed as to impart different rates of feed to said carriage, whereby the latter is adapted to operate upon sound records of different pitch, substantially as set forth.

2. In a phonograph, the combination with the rotating mandrel, traveling carriage, and a pair of feed screws adapted to feed the carriage in a forward direction at different rates of speed, of operatively connected means carried by said carriage for connecting the same in driven relation to either of said feed screws said means comprising pivoted vertically arranged hand lever means.

3. An attachment for phonographs comprising a frame 9 adapted to be sleeved upon the guide rod 8 and provided with a feed screw 13 and means for operatively connecting the same with the main shaft 3 of the phonograph, substantially as set forth.

4. An attachment for phonographs consisting of an arm 17 adapted to be secured to the traveling carriage 7 and provided with a movable support carrying a pair of feed nuts, and means for holding said movable support in suitable positions for interchangeably maintaining said feed nuts in operative relation to a pair of feed screws of the phonograph, substantially as set forth.

5. In a phonograph, the combination of the rotating mandrel, traveling carriage and a pair of rotary feed screws, of a support secured to said carriage, a spring, a feed nut carried by each end of the spring, and a lever pivoted to said support, said spring being so secured to said lever that pivoted movement thereof throws one nut into and the other out of engagement with its respective screw, simultaneously, substantially as set forth.

6. In a phonograph, the combination of

the traveling carriage and pair of rotary feed screws adapted to feed the carriage in a forward direction at different rates of speed, of a pair of feed nuts carried by the carriage and movable one into and the other out of engagement with their respective feed screws simultaneously, means for so moving said feed nuts and an indicator for designating the rates of feed of the carriage when either of said feed nuts is in engagement with its feed screw, substantially as set forth.

7. In a phonograph, the combination of the traveling carriage, and pair of rotary feed screws, of an arm 17 secured to said carriage, a lever pivoted thereto, and a pair of spring mounted feed nuts secured to said lever, said lever being movable so as to bring either of said feed nuts into and out of engagement with its feed screw, substantially as set forth.

8. In a phonograph, the combination of the traveling carriage, and a pair of rotary feed screws, of an arm secured to said carriage, a lever pivoted thereto, and a pair of spring mounted feed nuts secured to said lever, and lever means for moving said lever so as to bring either of said feed nuts into and out of engagement with its feed screw, substantially as set forth.

9. In a phonograph, the combination of the traveling carriage, and a pair of rotary feed screws, of an arm 17 secured to said carriage, a lever pivoted thereto, and a pair of spring mounted feed nuts secured to said lever, said lever being movable so as to bring either of said feed nuts into and out of engagement with its feed screw, and means for holding said lever in either of its extreme positions, substantially as set forth.

This specification signed and witnessed this 28th day of Jan., 1908.

PETER WEBER.

Witnesses:

FRANK D. LEWIS,
ANNA R. KLEHM.





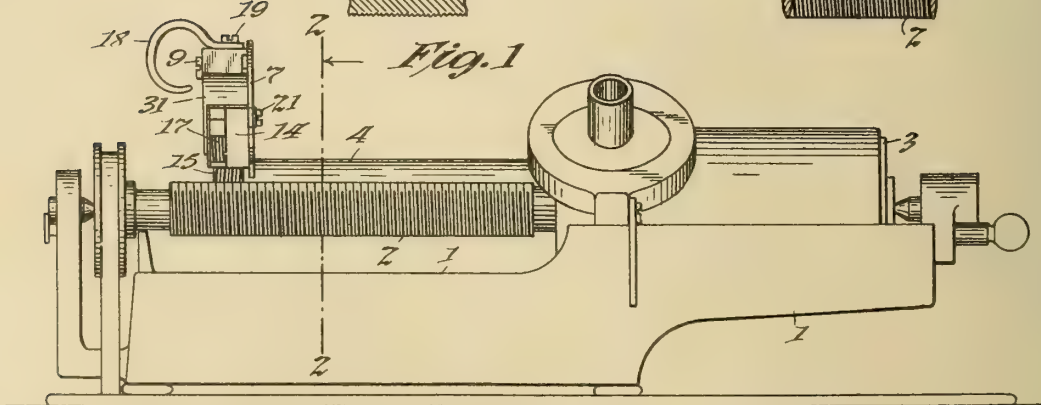
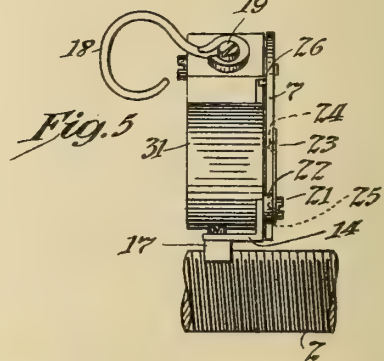
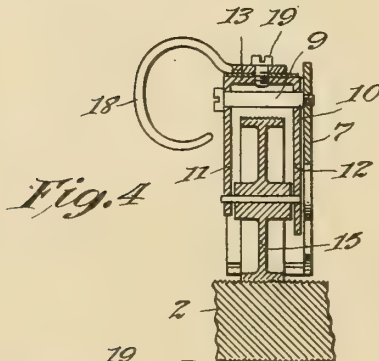
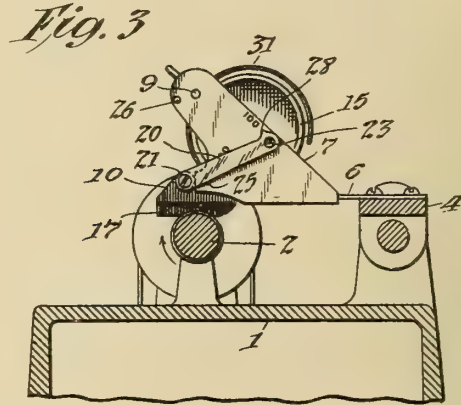
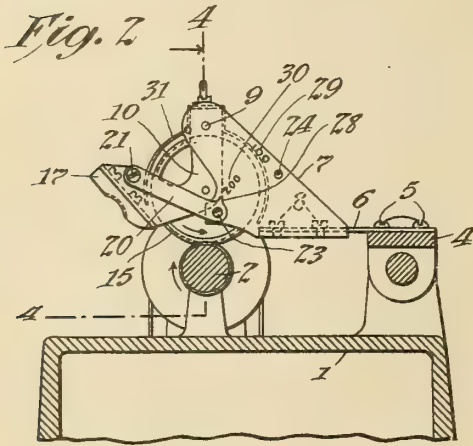
H. WOLKE.

PHONOGRAPH.

APPLICATION FILED JAN. 3, 1907.

932,222.

Patented Aug. 24, 1909.



Witnesses:

Frank D. Lewis
Delos Holden

Inventor:

Herman Wolke
by Frank L. Green
Atty.

UNITED STATES PATENT OFFICE.

HERMAN WOLKE, OF ORANGE, NEW JERSEY, ASSIGNOR TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

PHONOGRAPH.

932,222.

Specification of Letters Patent.

Patented Aug. 24, 1909.

Application filed January 3, 1907. Serial No. 350,648.

To all whom it may concern:

Be it known that I, HERMAN WOLKE, a citizen of the United States, residing at Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Phonographs, of which the following is a description.

My invention relates to phonographs of the type wherein the reproducer or recorder is carried by a traveling carriage which is fed across the surface of the rotating record so as to cause the stylus to trace upon said surface a spiral path, the progressive movement of the carriage being produced by means of a rotating feed screw. In an application filed concurrently herewith, Serial No. 350,649 I have described and claimed an improved form of feed mechanism adapted to be applied to a phonograph for feeding the movable carriage, by means of which I am able to use a feed screw having, for example, one-hundred threads to the inch and effect a progressive movement of the carriage of only one-half inch for one hundred turns of the feed screw, or one two-hundredth of an inch for one turn.

The object of the present invention is to provide means whereby the movable carriage may be fed at two different rates of speed, as desired, from one and the same feed screw. For instance, with a feed screw having one hundred threads to the inch, the device will permit the carriage to be fed either at the rate of one one-hundredth of an inch or one two-hundredth of an inch for each revolution of the screw, as desired by the user.

With this end in view my invention consists of the features hereinafter described and claimed.

Reference is hereby made to the accompanying drawings, of which—

Figure 1 is a front elevation of a phonograph provided with a feed device embodying my invention; Fig. 2 is a section on line 2—2 of Fig. 1 with the feed device in the proper position for feeding the carriage at the rate of one two-hundredth of an inch per feed screw revolution; Fig. 3 is a section on the same line as Fig. 2, with the feed device in position for feeding the carriage one one-hundredth of an inch per feed screw revolution; Fig. 4 is a section on line 4—4 of Fig. 2, and Fig. 5 is a front elevation showing the parts in the position of Fig. 3.

The phonograph shown is of a well known form and comprises the body 1, rotating feed screw 2, mandrel 3 and movable carriage 4. Secured at one end to the carriage 4 by screws 5 is a flat spring 6 which carries at its forward end a bracket 7 the same being secured thereto in any suitable manner, as by screws 8. This bracket is provided with a horizontal pin or stud 9 and upon the same is pivoted a movable frame 10 which comprises parallel vertical members 11 and 12 connected by the horizontal member 13 and having a horizontal flange 14. The members 11 and 12 are provided with bearings within which is journaled a rotatable screw or threaded wheel 15, the periphery of which is formed with a thread having the same pitch as the thread of the screw 2 and of reverse direction. For example, if the screw 2 is a right-handed screw then the thread of the screw 15 is left handed. The diameter of the wheel 15 is preferably double that of the screw 2 but may be of any diameter greater than the diameter of the said screw depending upon the speed at which it is desired to feed the carriage, as fully set forth in the concurrent application referred to. Secured to the horizontal flange 14 is a nut 17 the thread of which is formed so as to engage the thread of the screw 2, when in the position shown in Fig. 3. The frame 10 is capable of being turned on its pivot 9 so as to occupy either the position of Fig. 2 or that of Fig. 3. In the position of Fig. 3 the nut 17 will be in engagement with the feed screw and the carriage will therefore be fed forward at the rate of one one-hundredth of an inch for each revolution of the said screw; when the frame occupies the position of Fig. 2 the threaded wheel 15 will be in engagement with the feed screw, and the carriage will be fed forward at the rate of one two-hundredth of an inch for each revolution of the feed screw. For convenience in shifting the frame 10 from one position to the other a curved wire 18 is secured to the same by screw 19 and serves as a finger piece. A flat spring 20 is secured at one end to the frame 10 by a screw 21 threaded in the boss 22, the spring being held between the boss and the head of the screw. The outer end of the spring is formed with a projection 23 which is adapted to engage the sockets or depressions 24 and 25 formed in the face of the bracket 7. The movement of the frame 10

in one direction is limited by the engagement of the vertical member 12 with a pin 26 carried by the bracket 7. In this position the wheel 15 is in engagement with the feed screw 2 and the projection 23 of the spring 20 is in the socket 25, thus locking the frame 10 in position. The movement of the frame 10 in the opposite direction is limited by the engagement of the boss 22 with the forward edge of the bracket 7 and in this position the feed nut 17 will be in engagement with the feed screw 2 and the projection 23 will occupy the socket 24 and lock the frame in this position. The spring 20 is provided with an index finger 28 and the bracket 7 is provided with indicia 29 and 30 which co-operate with said index finger to indicate the speed at which the carriage will be fed. For instance, when the nut 17 is in engagement with the feed screw, the index finger 28 will be opposite the figures 100, thus indicating that the carriage will be fed one inch for each one hundred revolutions of the feed screw; when the index finger is opposite the figures 200 the threaded wheel 15 will be in engagement with the feed screw 2 and the device will indicate that the carriage will be fed forward one inch for every two hundred revolutions of the feed screw. The supporting spring 6 is so applied and the parts are so arranged that there will be a downward pressure of either the wheel 15 or nut 17 upon the feed screw 2 when in operative position, thus securing proper engagement between these two parts. A guard 31 is preferably secured to the frame 10 as by the screw 19 so as to inclose the threaded wheel 15 in order to protect the same.

Having now described my invention, what I claim as new and desire to secure by Letters Patent, is as follows:

1. In a phonograph, the combination of a feed screw, the threads whereof are all of substantially the same pitch, a movable carriage, and a plurality of means carried by said carriage each adapted for feeding the carriage at a different rate of speed by engagement with said feed screw, substantially as set forth.

2. In a phonograph, the combination of a feed screw, a movable carriage, and operatively connected interchangeable means carried upon said carriage for engagement with said feed screw, substantially as set forth.

3. In a phonograph, the combination of a feed screw, a movable carriage, connected interchangeable means upon said carriage for engagement with said feed screw, said interchangeable means being so mounted that as one approaches the feed screw the other recedes therefrom, substantially as set forth.

4. In a phonograph, the combination of a feed screw, a movable carriage, a plurality of connected means pivotally attached to the said carriage for engagement with said feed screw, and means for moving either one

thereof into said engagement for feeding the carriage at different rates of speed, substantially as set forth.

5. In a phonograph, the combination of a feed screw, a movable carriage, a frame on said carriage, said frame being provided with a feed nut and a rotary wheel and being movable so as to bring either the nut or the wheel into engagement with the feed screw, substantially as set forth.

6. In a phonograph, the combination of a feed screw, a movable carriage, a feed nut, and a wheel provided with means for operatively engaging the feed screw, the said nut and wheel being movable with respect to the carriage so that either one may be brought into engagement with the feed screw, substantially as set forth.

7. In a phonograph, the combination of a feed screw, a movable carriage, a frame connected thereto by a pivot and provided with a feed nut and a rotary wheel so arranged that either may be brought into proper position for engagement with the feed screw when the frame is moved on its pivot, substantially as set forth.

8. In a phonograph, the combination with a feed screw, a movable carriage, and a frame connected to said carriage by a pivot, of a feed nut and rotary wheel carried by said frame in such position as to be brought into engagement with the feed screw when the frame is moved on its pivot, and an index finger secured to said frame for indicating the rate of feed of said carriage, substantially as set forth.

9. In a phonograph, the combination of the feed screw, movable carriage and frame carried by the carriage, said frame being provided with a feed nut and a rotary threaded wheel and being movable so as to bring either the nut or threaded wheel into engagement with the feed screw, substantially as set forth.

10. In a phonograph, the combination of the feed screw, movable carriage and frame connected thereto by a horizontal pivot, and provided with a feed nut and a rotary threaded wheel so arranged as to be brought into proper position for engagement with the feed screw when the frame is moved on its pivot, substantially as set forth.

11. In a phonograph, the combination of the feed screw, movable carriage and spring supported frame carried by the carriage, said frame being provided with a feed nut and a rotary threaded wheel and being movable so as to bring either the nut or threaded wheel into engagement with the feed screw, substantially as set forth.

12. In a phonograph, the combination of the feed screw, movable carriage, a flat spring secured at one end to the carriage and a frame secured to the free end of the spring, said frame being provided with a

feed nut and a rotary threaded wheel and being movable so as to bring either the nut or threaded wheel into engagement with the feed screw, substantially as set forth.

5 13. In a phonograph, the combination of the feed screw, movable carriage, a frame carried by said carriage, said frame being provided with a feed nut and a rotary threaded wheel, and being movable so as to
10 bring either the nut or threaded wheel into engagement with said feed screw, and means for locking said frame in either of its operative positions, substantially as set forth.

14. In a phonograph, the combination of
15 the feed screw, movable carriage, a frame carried by said carriage, said frame being provided with a feed nut and a rotary threaded wheel, and being movable so as to bring either the nut or threaded wheel into
20 engagement with said feed screw, and means for limiting the movement of said frame in each direction beyond its operative position, substantially as set forth.

15. In a phonograph, the combination of
25 the feed screw, movable carriage and inter-

changeable means carried by the carriage for engagement with said feed screw for feeding the carriage at different rates of speed, and an indicator movable with said interchangeable means for indicating the
30 rate of feed of the carriage, substantially as set forth.

16. In a phonograph, the combination with the feed screw, movable carriage and frame connected to said carriage by a hori-
35 zontal pivot, of a feed nut and rotary threaded wheel carried by said frame in such positions as to be brought into engagement with the feed screw as the frame is moved on its pivot, and an index finger se-
40 cured to said movable frame and coöperating with relatively fixed indicia for indicating the rate of feed of said carriage, substantially as set forth.

This specification signed and witnessed
45 this 22nd day of Decr., 1906.

HERMAN WOLKE.

Witnesses:

FRANK L. DYER,
FRANK D. LEWIS.



J. W. AYLSWORTH.
SOUND RECORD MOLD.
APPLICATION FILED JAN. 29, 1908.

932,237.

Patented Aug. 24, 1909.

Fig. 1

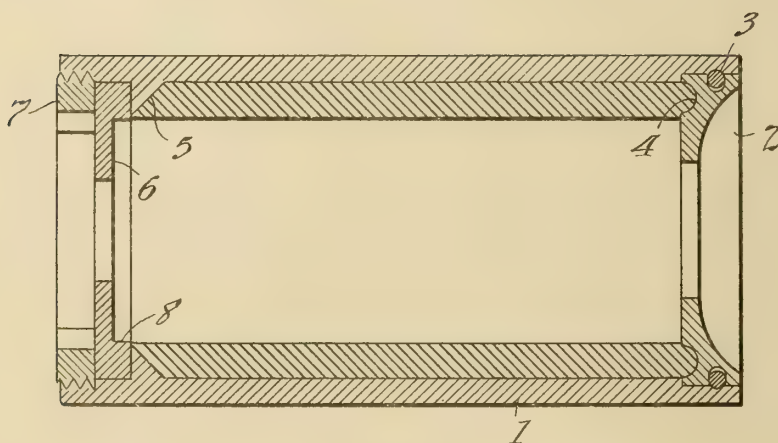
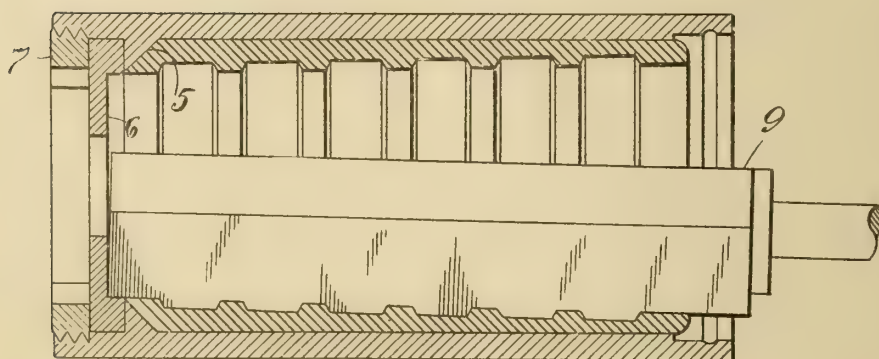


Fig. 2



Witnesses:

Frank D. Lewis
Herbert H. Dyke

Inventor:

Jonas W. Aylsworth
by Frank L. Soper
Atty.

UNITED STATES PATENT OFFICE.

JONAS W. AYLSWORTH, OF EAST ORANGE, NEW JERSEY, ASSIGNOR TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

SOUND-RECORD MOLD.

932,237.

Specification of Letters Patent.

Patented Aug. 24, 1909.

Application filed January 29, 1908. Serial No. 413,167.

To all whom it may concern:

Be it known that I, JONAS W. AYLSWORTH, a citizen of the United States, residing at 223 Midland avenue, East Orange, county of Essex, and State of New Jersey, have invented certain new and useful Improvements in Sound-Record Molds, of which the following is a description.

My invention relates to various new and useful improvements in sound record molds, adapted for use in the molding of duplicate records by a spinning process in which the mold is rotated at a high speed and contains a charge of molten material which is distributed over the record surface by centrifugal force. In actual practice, difficulty has been encountered in constructing the ends for the molds in such a way that they will be perfectly tight to prevent the escape of the molten wax-like material, as well as to prevent the entrance of water, which is ordinarily sprayed over the molds to cool the records after the wax-like material has been distributed over the record surface. One of the caps is readily removable so that after the record is formed it may be taken off to permit the record to be removed from the mold after it has contracted diametrically. The other cap forms practically a permanent fixture and considerable trouble has been experienced in connection therewith, for the reason that when the reaming tool is introduced to finish the interior of the record, it is liable to injure the cap and destroy the joint between the cap and the mold. To overcome these difficulties, I make use of the construction hereinafter described and claimed, in which a hardened steel cap is used, which in addition to forming a tight joint at the end of the mold, will also act as a stop or gage for the reaming tool, limiting its position not only longitudinally with respect to the record, but also limiting the movement which the reaming tool shall make to define the thickness of the record and its internal diameter.

In order that the invention may be better understood, attention is directed to the accompanying drawing, forming part of this specification, and in which—

Figure 1, is a longitudinal sectional view of the complete mold; and Fig. 2 a corresponding view of the same with the end cap removed and showing a record formed in the mold and the reaming tool operating thereon.

In both of these views, corresponding parts are represented by the same numerals of reference.

The mold 1, is of any usual construction, being formed on its interior with a negative representation of the desired master. At one end, the mold is provided with a removable cap 2, secured in place by a spring ring 3, engaging a shell or recess in the mold, whereby the cap may be removed by pulling the same outwardly by means of a suitable tool. I do not claim the construction of this cap in the present application, and it will be understood that any other suitable arrangement may be adopted for the purpose. Preferably, the removable cap is provided with an annular recess 4, on its inner face so as to define the corresponding end of the molded record as shown in Fig. 2. Ordinarily the mold 1 is made with a lining of copper and with an outer shell of brass. It is formed with a shoulder 5, in which may be engraved in negative, the name of the selection to be duplicated, and engaging with this shoulder is a cap 6 held in position in any suitable way, as for example, by a ring 7, screwed into the end of the mold. It will be observed that the shoulder 8 of the cap 6, is located slightly within the plane of the inner edge of the shoulder 5. When the reaming tool 9 is therefore introduced within the mold so as to finish the interior of the record, the end of the reaming tool will engage the cap 6, which therefore acts as a gage for limiting the position of the reaming tool longitudinally with respect to the record, and when the reaming tool is then moved diametrically outward, its end will engage the shoulder 8 as shown in Fig. 2, so as to thereby limit such movement and define the thickness of the record, as well as its interior diameter. By making a cap of hardened steel, as explained, it cannot be injured by the reaming tool, while at the same time, it performs the additional function of acting as a gage to the reaming tool, both longitudinally and diametrically.

Having now described my invention, what I claim as new and desire to secure by Letters Patent is as follows:

1. A cylindrical sound record mold provided with a cap of hard metal formed with an annular shoulder on the inner side thereof, having a cylindrical bore of a less radius than the mold by the thickness of the record

to be formed, adapted to serve as a gage to limit the interior dimensions of the record in finishing the latter, substantially as set forth.

5 2. A cylindrical sound record mold formed on its interior with a tapered shoulder and provided with a cap of hard metal formed with an annular shoulder which engages the tapered shoulder, and having a cylindrical
10 bore of slightly less diameter than the tapered shoulder, adapted to serve as a gage to limit the interior dimensions of the record in finishing the latter, substantially as set forth.

15 3. A cylindrical sound record mold formed on its interior with a shoulder having a surface on the inner side thereof adapted to form one end of the record, and a cap of hard metal maintained tightly in engagement with the outer side of said shoulder,
20 and means for securely but removably so maintaining it, substantially as set forth.

4. A cylindrical sound record mold formed on its interior with a shoulder having a surface on the inner side thereof adapted to form one end of the record, and a cap of
25 hard metal having an annular shoulder maintained tightly in engagement with the outer side of said mold shoulder, and means for securely but removably so maintaining it, substantially as set forth. 30

5. A cylindrical sound record mold formed on its interior with a tapered shoulder, a hardened steel cap maintained tightly in engagement with said shoulder and a threaded
35 ring engaging the cap, substantially as and for the purposes set forth.

This specification signed and witnessed this 21 day of Jan. 1908.

JONAS W. AYLSWORTH.

Witnesses:

FRANK D. LEWIS,
ANNA R. KLEHM.



APPLICATION FILED JAN. 20, 1908.

Patented Aug. 24, 1909.



12 3 ¹⁰ *Inventor:*
John F. Ott
by Frank L. Myers
Attw.

UNITED STATES PATENT OFFICE.

JOHN F. OTT, OF ORANGE, NEW JERSEY, ASSIGNOR TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

PHONOGRAPH.

932,314.

Specification of Letters Patent.

Patented Aug. 24, 1909.

Application filed January 20, 1908. Serial No. 411,832.

To all whom it may concern:

Be it known that I, JOHN F. OTT, a citizen of the United States, and a resident of Orange, in the county of Essex and State

of New Jersey, have invented certain new and useful Improvements in Phonographs, of which the following is a description.

My invention relates to phonographs of the type wherein the sound box is carried on a traveling carriage to which a progressive movement is imparted by means of a rotating feed screw, so that the reproducer or recorder stylus traces a spiral path with respect to the record surface. It has been the usual practice for many years to provide a feed screw of fine pitch which will advance the traveling carriage a distance of one one-hundredth of an inch for each revolution of the mandrel. More recently, however, it has been found possible to manufacture a sound record in which the record groove has two hundred turns or threads to the inch, so that it is desirable to provide a phonograph in which the feed of the carriage will be suitable for operating upon a record of this description. In view of the fact, however, that there are already thousands of phonographs in use in which the feed screw advances the carriage one one-hundredth of an inch per mandrel revolution, and a vast number of records are also in use having a pitch of one one-hundredth of an inch, it is desirable to provide means which may readily be applied to such phonographs whereby the feed screw may be driven at one-half the speed at which it has been heretofore driven, such means also permitting the driving of the feed screw at its usual speed, so that the phonograph can be used interchangeably with sound records having either one hundred or two hundred threads per inch, and my invention has for its object the provision of interchangeable means of this character which may be readily applied to a phonograph and in which, when so applied, the parts may be readily shifted with respect to each other, so as to drive the feed screw at the desired rate of speed.

Reference is hereby made to the accompanying drawings of which —

Figure 1 is an end elevation of a well-known form of phonograph to which my invention is applied; Fig. 2 is a plan view, partly in section on line 2—2 of Fig. 1, and

Fig. 3 is a detail section on line 3—3 of Fig. 2.

Corresponding parts are designated by the same reference numerals in the several views.

The phonograph shown comprises a base or frame 1 in which is journaled the main shaft 2 which carries the mandrel 3 and drive pulley 4 which receives the driving belt from the phonograph motor. The feed screw shaft 5 is inclosed within a tubular guard 6, the end of which is secured within an opening in the frame 1, and within the end of said tube 6 is secured a sleeve 7 which forms a bearing for the reduced portion 8 of the shaft 5. The end of the said shaft 5 is bored out to form a recess 9 within which is situated a longitudinally movable pin 10, having a milled head 11 for convenience in shifting the same. A pair of collars 12 and 13 are fixed to the portion 8 of the shaft 5 by means of set screws 14 and 15, and between said collars are a pair of loosely mounted spur gears 16 and 17. A slot 18 is formed in the portion 8 of the shaft 5 upon which the gears 16 and 17 are mounted, and a projection 19 is fixed to the pin 10 and extends through the said slot for the purpose of locking or keying either of the said gears to the shaft, said gears being formed with recesses 20 and 21 respectively, adapted to receive said projection. There is a spur gear 22 fixed to the mandrel shaft 2 and the same engages a spur gear 23 which carries another spur gear 24, said gears being rotatably mounted upon a boss 25 which may be integral with the frame 1 as shown. The gear 23 meshes with the gear 17 and the gear 24 meshes with the gear 16. A cover plate 26 may be used to protect the gears and the same is held in position by a screw 27 threaded within the boss 25.

When the parts are in the positions shown in Figs. 2 and 3, the gear 17 is keyed to the shaft 5 by means of the projection 19 carried by the longitudinally movable pin 10, and the said shaft will therefore be driven by the shaft 2 through the gears 22, 23 and 17, and these gears are so proportioned that the speed of the shaft 5 will be suitable for causing the sound box carriage 28 to be fed at the proper speed for operating upon a sound record having one hundred threads to the inch. When the pin 10 is moved outward from the position shown so as to bring the projection 19 out of engagement with

the recess 21 of the gear 17, it may readily be caused to enter the recess 20 of the gear 16 which gear will then be keyed to the shaft 5 and the latter will be driven from the shaft 2 through the gears 22, 23, 24 and 16. These gears are so proportioned that the speed imparted to the shaft 5 will be suitable for feeding the carriage 28 operatively with respect to a sound record having two hundred threads to the inch. All that is necessary in order to convert the phonograph from one which is adapted to play a record of one hundred threads to the inch to one for playing a record of two hundred threads to the inch, is to move the pin 10 outwardly, and vice versa to convert the machine from one which plays records having two hundred threads to the inch to one which will play records having one hundred threads to the inch, the only adjustment necessary is an inward movement of the pin 10.

Having described my invention, what I claim is:

1. In a phonograph, the combination with the mandrel and feed screw shafts, of a plurality of gear trains uniting the two with different gear ratios, said trains including gears loosely mounted with respect to one of said shafts, a bearing for the end of said shaft, said gears being mounted on said shaft outside of said bearing, and a pin movable longitudinally of said shaft having a projection passing through a slot in said shaft and adapted to engage recesses formed in said gears, substantially as described.

2. In a phonograph, the combination with the mandrel and feed screw shafts, of a plurality of gear trains uniting the two with different gear ratios, said trains including gears loosely mounted with respect to one of said shafts, a bearing for said shaft near the end thereof, said shaft having a reduced portion coacting therewith, said gears being mounted on said shaft outside of said bearing, and a pin movable longitudinally of said shaft having a projection passing through a slot in said shaft and adapted to engage recesses formed in said gears, substantially as described.

3. In a phonograph, the combination with the mandrel and feed screw shafts, of a plurality of gear trains uniting the two with different gear ratios, said trains including gears loosely mounted with respect to one of said shafts, a bearing for said shaft near the end thereof, said shaft having a reduced

portion coacting therewith, said gears being mounted on said shaft outside of said bearing, collars on said shaft on either side of said gears, said shaft having a longitudinal recess in the end thereof, and a slot extending from said recess to the exterior of said shaft, and a pin movable longitudinally in said recess having a projection passing through said slot and adapted to engage recesses formed in said gears, substantially as described.

4. In a phonograph, the combination with the mandrel and feed screw shafts, of a plurality of gear trains uniting the two with different gear ratios, said trains comprising a gear fast on one of said shafts, gears mounted concentrically and secured together, and gears loosely mounted on the other of said shafts, a bearing for the end of said last named shaft, said gears being mounted on said shaft outside of said bearing, and a pin movable longitudinally of said shaft having a projection passing through a slot in said shaft and adapted to engage recesses formed in said gears, substantially as described.

5. In a phonograph, the combination with the mandrel and feed screw shafts, of a plurality of gear trains uniting the two with different gear ratios, said trains including gears loosely mounted with respect to one of said shafts and adjacent the end thereof, a bearing for said shaft, and a pin movable longitudinally of said shaft having a projection passing through a slot in said shaft and adapted to engage recesses formed in said gears, substantially as described.

6. In a phonograph, the combination with the mandrel and feed screw shafts, of a plurality of gear trains uniting the two with different gear ratios, said trains comprising a gear fast on one of said shafts, gears mounted concentrically and secured together, and gears loosely mounted on the other of said shafts, a bearing for the end of said last named shaft, and a pin movable longitudinally of said shaft having a projection passing through a slot in said shaft and adapted to engage recesses formed in said gears, substantially as described.

This specification signed and witnessed this 13 day of Jan. 1908.

JOHN F. OTT.

Witnesses:

H. H. DYKE.

FRANK D. LEWIS.

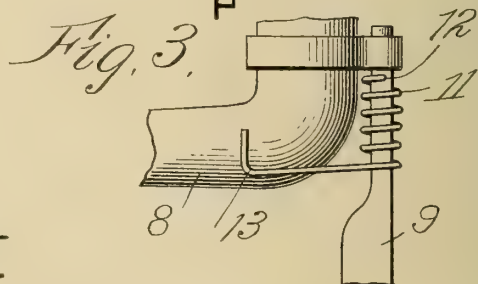
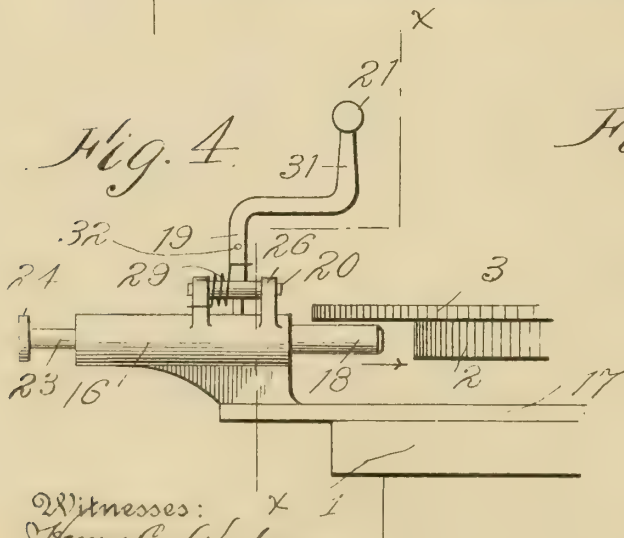
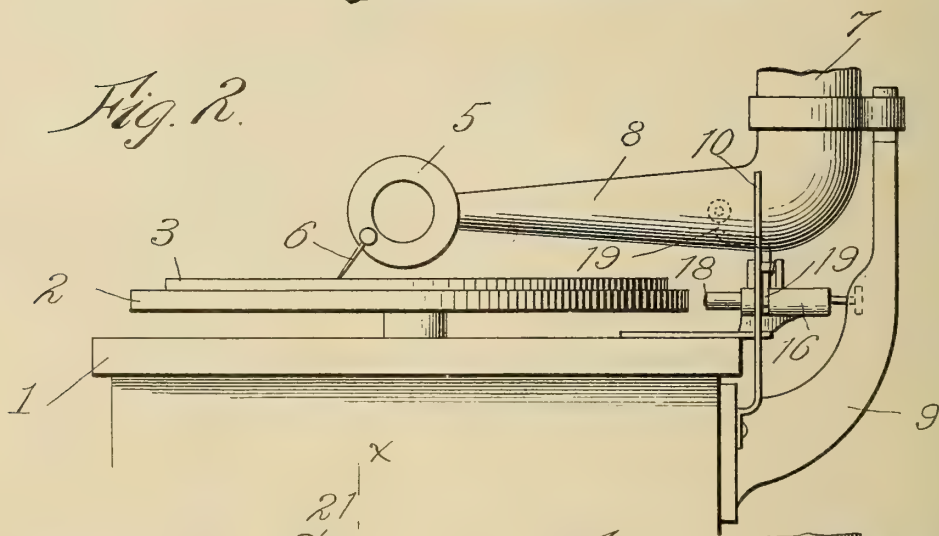
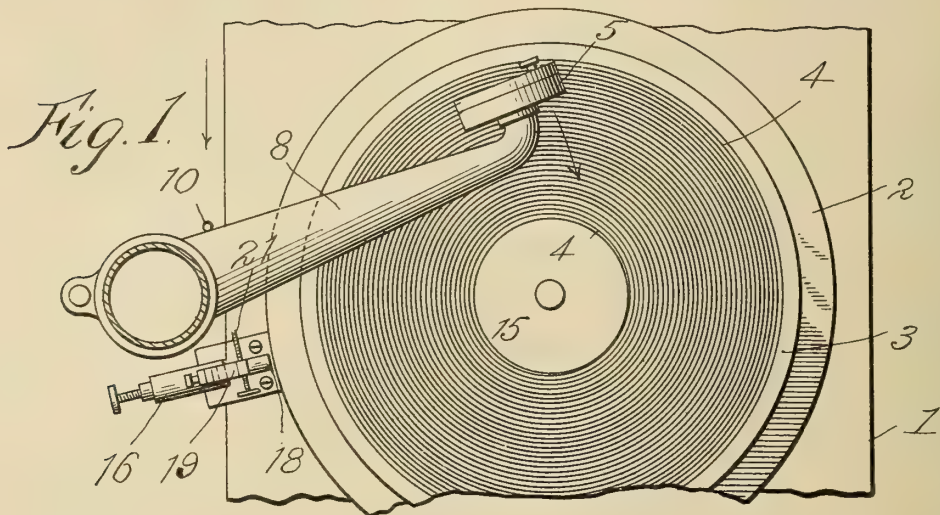


H. F. COOK.
TALKING MACHINE.
APPLICATION FILED APR. 8, 1908.

933,234.

Patented Sept. 7, 1909.

2 SHEETS—SHEET 1.



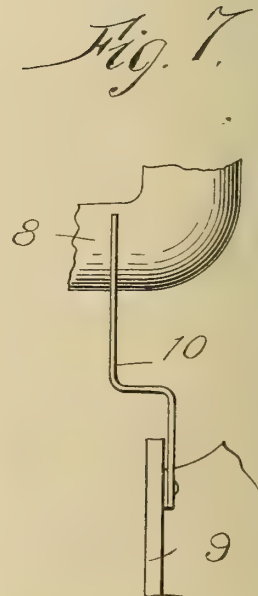
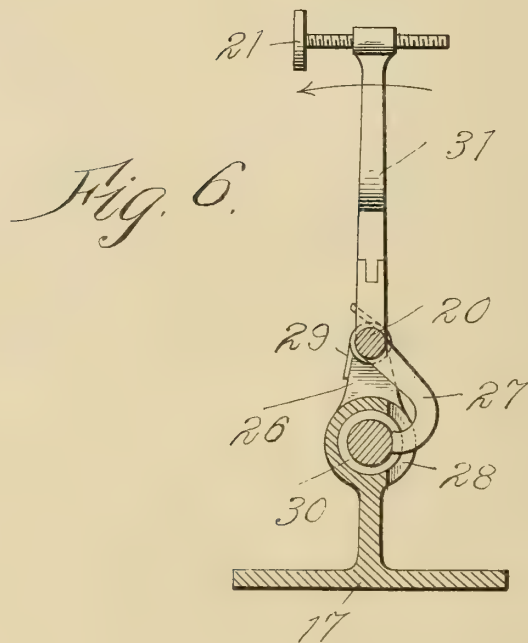
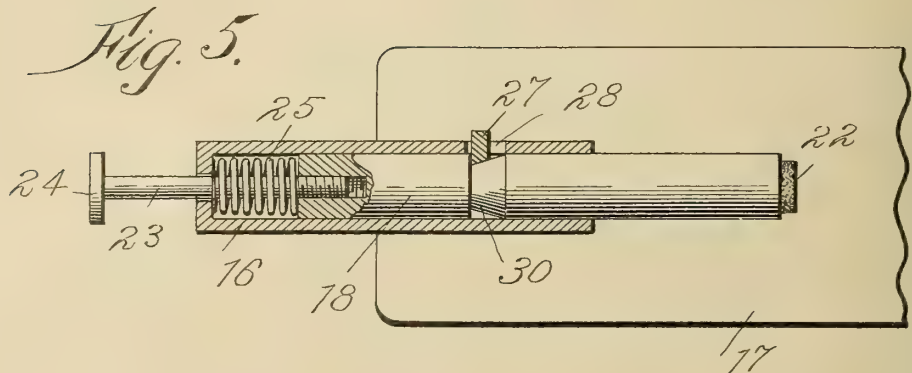
Witnesses:
Henry C. Workman
Octavius Shighs

Henry F. Cook
Inventor,
By his Attorneys *Smith & Co.*

H. F. COOK.
TALKING MACHINE.
APPLICATION FILED APR. 8, 1908.

933,234.

Patented Sept. 7, 1909.
2 SHEETS—SHEET 2.



Witnesses:
Henry C. Workman
Atavus Knight.

Henry F. Cook
Inventor,
By his Attorneys *Freight & Co.*

UNITED STATES PATENT OFFICE.

HENRY F. COOK, OF SAG HARBOR, NEW YORK.

TALKING-MACHINE.

933,234.

Specification of Letters Patent.

Patented Sept. 7, 1909.

Application filed April 8, 1908. Serial No. 425,924.

To all whom it may concern:

Be it known that I, HENRY F. COOK, a citizen of the United States, residing at Sag Harbor, in the county of Suffolk and State of New York, have invented certain new and useful Improvements in Talking-Machines, of which the following is a full and clear specification, illustrated by the accompanying drawings.

My invention relates to a means by which the movement of the stylus in spiral grooved records is stopped immediately after the stylus has left the record groove in order to avoid disagreeable sounds produced by the stylus scratching on the record carrying body beyond the record groove.

In particular it relates to means which are controlled in their stopping operation by the member or arm which carries the sound box.

I have also illustrated and described means by which the sound box with its arm may be quickly moved farther in the direction in which it has been moved over the record to operate the stopping means.

I have illustrated my invention in the accompanying drawings of which—

Figure 1 is a plan view of a part of a flat record talking machine. Fig. 2 is a side elevation thereof seen in the direction of the arrow in Fig. 1. Fig. 3 is a modification of the means for yieldingly moving the sound box over the record. Fig. 4 is a side view of the stopping device acting upon the record table after the stylus has passed over the record, shown in enlarged scale. Fig. 5 is a horizontal sectional view thereof, in still larger scale. Fig. 6 is a vertical section thereof on line X X in Fig. 4. Fig. 7 is a modification of spring 10 shown in Fig. 2.

In Figs. 1 and 2, 1 is the top plate of the box containing the mechanism for operating the record table 2 in any suitable manner well known in this art, 3 represents the record plate containing the spiral grooved record 4, 5 is the sound box gliding, by means of the stylus 6, over the disk 3 in the spiral grooved record 4 in the well known manner. The sound box 5 may be connected in any usual method to the horn 7, only part of which is shown in Fig. 2, as for example through arm 8 which is shown in the drawings as forming a part of the horn, which however, may be used only as a supporting member for the sound box, as is well known in this type of machine, the horn being con-

nected to the sound box by suitable tubing independently of the supporting member 8. I shall, therefore, hereinafter refer to the member supporting the sound box with the horn as arm or supporting arm. As shown in Figs. 1 and 2 arm 8 is pivoted in a bracket 9 fastened to the side of box 1 so that the sound box and stylus in their travel over the record will travel in a circle around the pivot of bracket 9. The direction of travel from the periphery of record disk 3 toward the center is indicated by the arrow in Fig. 1.

I have shown as an example means for moving the sound box over the record in the above mentioned direction and beyond the limits of the record which operate independently of the motion which the spiral groove tends to impart to the stylus and sound box in the same direction while the record disk is revolving. To bracket 9, Fig. 2, is fastened a spring 10 in the form of a rod, one end of which is fixed to bracket 9, while the other end bears against the side of arm 8 as shown in Figs. 1 and 2. The position of this rod is adjusted so that it is bent out of its normal position by arm 8 when the sound box is at or near the periphery of the record as shown in Fig. 1. Rod 10 will thus tend to move the sound box in the direction toward the center of the disk as shown in this figure. This tension may be so adjusted that it will be just strong enough to keep the stylus in the middle of the record groove without imparting an undue thrust against either side of the groove, and its yielding may be increased by offsetting it as shown in Fig. 7.

Instead of using a straight rod as shown in Fig. 2 a spiral spring may be used in the manner as shown for instance in Fig. 3. In the modification shown in this figure the spiral spring 11 disposed on pivotal bracket 9 is held at its end 12 by this bracket, while its other end 13 bears against arm 8 thereby tending to move the latter in the same manner as rod 10 described before.

In order to stop the machine as soon as the needle of the sound box has passed the record various devices have been designed for stopping the record plate or drum which devices, however, are more or less complicated. The novel stopping device I have shown in the accompanying drawings in Figs. 4-6 has the advantage of being simple and easily attachable to any talking machine without changing or otherwise disturbing its mechanism. The stopping device comprises a barrel 10

(Fig. 4) which is suitably fastened to box 1 by means of bracket 17. Disposed within said barrel is a plunger 18 which protrudes a suitable distance beyond barrel 16 and is provided at its protruding end with a head of suitable frictional material 22, as for instance soft rubber or the like. Into the other end of plunger 18, which is disposed within barrel 16 is screwed or otherwise suitably fastened rod 23 which protrudes loosely through the closed rear end of barrel 16, and carries a head 24 at this protruding end. Between the rear end or bottom of barrel 16 and the plunger 18 is disposed a spring 25 tending to force plunger 18 out of the barrel. On top of barrel 16 are provided two brackets 26 (Fig. 4), between which is oscillatingly pivoted a lever 19 by means of pivot 20. The lower end 27 of lever 19 protrudes through an opening 28 provided in barrel 16 and furthermore is adapted to be engaged, when forced through said opening by means of spring 29, by a notch or a groove 30 provided in plunger 18. The upper end of lever 19 has an extension arm 31, the end of which is formed into a nut in which stop screw 21 is disposed. If plunger 18 is retracted into barrel 16, as shown in Fig. 5, by pulling it back into the barrel by means of head 24, spring 29 will force the end 27 of lever 19 into groove 30 and thus lock plunger 18 in this position. Thus it will be seen that if lever end 27 is released from groove 30, for instance by throwing the upper extension arm 31 of lever 19 to the left (see arrow in Fig. 6), spring 25 will force plunger 18 out of barrel 16 so far as the length of pin 23 will allow. This whole stopping device is placed on and fastened to box 1 so that extension arm 31 will protrude into the path of sound box carrying arm 8 which moves in the manner described above over the record. The stopping device is further disposed so on box 1 that arm 8 will strike screw 21 of the stopping device soon after the sound box has left the record.

It will now be seen that there being no guide groove and very little resistance on the smooth, generally polished, surface of record plate 3, the spiral formed by the stylus on this surface under the tension of spring 10 acting upon arm 8 will be of much greater pitch than that of the record groove; in other words the arm will tend to move quicker toward the center at the same revolution speed of the disk than it was moving when the stylus was guided by the record groove. Upon engagement of screw 21 by arm 8 lever 31 will be carried along with the arm by the action of spring 10 and thereby release plunger 18 which was heretofore held in retracted position by the end 27 of lever 19. Spring 25 will throw the plunger 18 out of barrel 16 and, the whole stopping device being disposed close enough

to record table 2, head 22 of plunger 18 will bear against table 2 and thus stop the operation of the machine.

It frequently occurs that it is desirable to use record disks on the talking machine of larger diameter than the record table. In order that an unusually large record may not interfere with the structure of my stopping device, I have shaped bracket 17, by which the stopping device is carried, offset so that the main body of the stopping device may be far enough away from the center of the record disk so as to clear the largest record disk which may be possibly used on this kind of machine. Plunger 18 is, therefore, of sufficient length so as to successfully cooperate with record plate 2 clear of the record disk. In order to have screw 21 engaged by arm 8 as near the center of the disk as possible, I have offset arm 31 somewhat so as to counteract the offsetting of bracket 17.

In case it is not desired to have the table stop automatically by the inward movement of arm 8, I have pivoted extension arm 31 of lever 19 at 32, so that it may be thrown out of the path of arm 8 by hand at any time, and the stopping device can then be operated by hand at any time desired or by other suitable stopping device common to this kind of machine.

While I have shown in the drawings and referred in the specification to a brake as an example of a stopping member, I do not wish to limit myself to this particular kind, since the spirit of my invention involves a stopping member independent of the record table operating mechanism, suitably cooperating with the table, which member is released to operate by a trip finger, cooperating with any suitable element, following the movement of the sound box over the record, such as for example the arm 10 referred to in the specification. Moreover, while I have shown my invention applied to a flat record talking machine it is evident that the idea of yieldingly moving the stylus and its supporting means in a record groove independent of the motion imparted to the stylus by the record groove itself during the operation of the machine but cooperating therewith, may be also applied to a cylindrical record talking machine with grooved records without departing from the spirit of my invention.

I claim:

1. In a sound reproducing machine, the combination with a record disk having a spiral record groove, means for operating said disk, a sound box adapted to follow the line of said groove and to run substantially radially to said disk, means connected to said sound box adapted to move with said box and means for moving said box; of a stop member disposed near the periphery of said disk

having a tube, a plunger disposed therein having a notch, a compression spring within said tube tending to force said plunger out of said tube and against said disk, a trip finger suitably pivoted on said tube, a spring on said finger tending to hold its lower end against said plunger to engage in the notch of said plunger, hand operated means on said plunger for pushing same into said tube to cause engagement of said notch and said finger and to compress the spring in said tube, the upper end of said trip finger disposed in the path of said sound box connected means, said means adapted to trip said finger when said sound box has passed said record groove to release the plunger and stop said disk.

2. In a sound reproducing machine, the combination with a record disk having a spiral record groove, means for operating said disk, a sound box adapted to follow the line of said groove and to run substantially radially to said disk, an arm connected to said sound box adapted to move with said box, means for moving said box; of a stop member disposed near the periphery of said disk having a tube, a plunger disposed therein having a notch, a compression spring within said tube tending to force said plunger out of said tube and against said disk, a trip finger suitably pivoted on said tube, a spring on said finger tending to hold its lower end against said plunger to engage in the notch of said plunger, hand operated means on the plunger for pushing same into said tube to cause engagement of the notch and the finger and to compress the spring in said tube, the upper end of said trip finger disposed in the path of said arm, said arm adapted to trip said finger when the sound box has passed said record groove to release said plunger and stop said disk, and means for removing said trip finger from the path of said arm to render said automatic tripping device inoperative.

3. In a sound reproducing machine, the combination with a record disk having a spiral record groove, means for operating said disk, a sound box adapted to follow the line of said groove and to run substantially radially to said disk, an arm connected to said sound box adapted to move with said box, and means for moving said box; of a stop member disposed near the periphery of said disk having a tube, a plunger disposed therein having a notch, a compression spring within said tube tending to force said plunger out of said tube and against said disk, a trip finger suitably pivoted on said tube, a spring on said finger tending to hold its lower end against said plunger to engage in the notch of said plunger, hand operated means on the plunger for pushing same into said tube to cause engagement of the notch and the finger and to compress the

spring in said tube, the upper end of said trip finger disposed in the path of said arm, said arm adapted to trip said finger when the sound box has passed said record groove to release said plunger and stop said disk, the upper end of said finger having a joint adapted to be moved transversely to the pivotal movement of said finger to remove the upper end of said tripping finger from the path of said arm to render the automatic tripping device inoperative.

4. In a sound reproducing machine, the combination with a record carrying member, a sound box adapted to glide substantially horizontally over said record carrying member, means for moving said box, a sound box connected member moving with said box, a stop member disposed adjacent to said record carrying member and adapted to cooperate with it, having a trip finger protruding substantially vertically into the path of said box connected member, adapted to trip said stop member when engaged by said sound box member, and means on said trip finger permitting the adjusting of the time of engagement of said finger with said sound box member relatively to the position of said sound box on said record carrying member.

5. In a sound reproducing machine, the combination with a record carrying member, a sound box adapted to glide substantially horizontally over said record carrying member, means for moving said box, a sound box connected member moving with said sound box, a stop member disposed adjacent to said record carrying member and adapted to cooperate with it, having a trip finger protruding substantially vertical into the path of said box connected member, adapted to trip said stop member when engaged by said box member, said trip finger having a joint suitably disposed to cause the removal of the engaging portion of said finger from the path of said box member.

6. In a sound reproducing machine, the combination of a record disk, a supporting table adapted to support said disk, said disk having a greater diameter than said table, a sound box adapted to glide over said record disk, an arm connected to said sound box adapted to move with said box, and a stopping device adapted to be operated by the movement of said arm and disposed near the periphery of said table to clear said disk having a plunger of suitable length to protrude underneath said disk and to cooperate with said table at its periphery to stop the machine.

7. In a sound reproducing machine the combination of a rotating table or disk having a record groove, a stylus adapted to travel in said groove, a pivoted arm connected to said stylus, means for propelling the stylus and arm beyond the limit of the record groove, a plunger barrel fixed in po-

sition radially to the periphery of the table, a spring actuated plunger brake or stop member supported in said barrel radially to the periphery of the table and a substantially vertical spring actuated trigger disposed oscillatorily in a vertical plane engaging a portion of said stop member when the same is retracted, and projecting into the path of the pivoted arm, substantially as and for the purpose set forth.

8. A talking machine brake mechanism comprising a longitudinally movable brake plunger, means for normally projecting the same into operative position, a shoulder on said plunger, a latch engaging said plunger to hold the same retracted and an upright arm connected with said latch and operative to release the same and a reproducer arm movable to engage said upright arm to re-

lease said latch to permit the operative movement of said brake plunger.

9. A talking machine brake mechanism comprising a sliding bolt, a spring surrounding said bolt to project the same, a shoulder provided upon said bolt, a spring pressed latch operative to engage said shoulder to hold said bolt retracted, an upright arm pivotally connected to said latch to release the same, and a reproducer arm in whose path of movement said pivoted arm extends, said reproducer arm being operative upon said upright arm to cause the release of said bolt by said latch.

HENRY F. COOK.

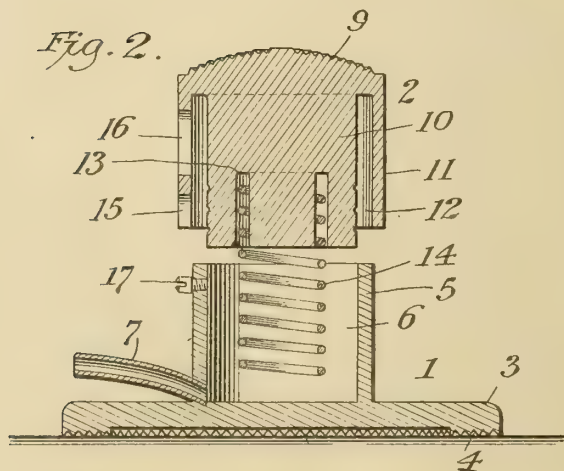
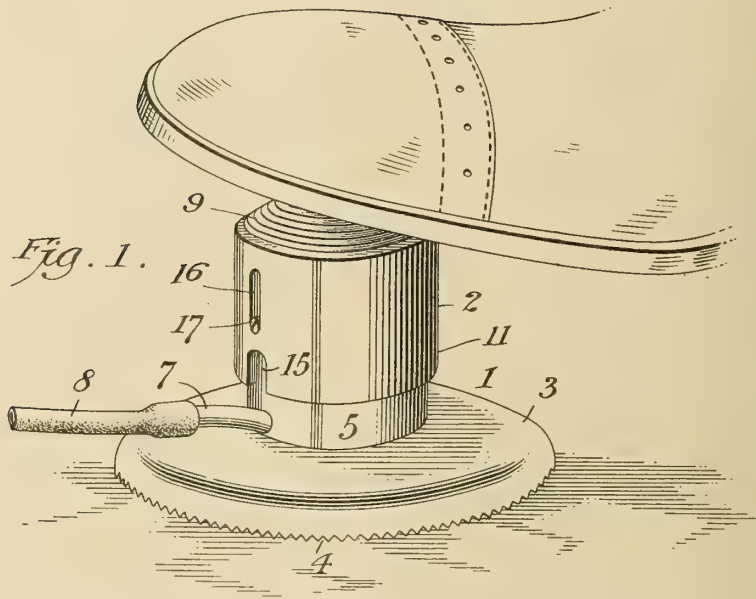
Witnesses:

HARRY E. KNIGHT,
H. ALFRED JANKE.

T. H. MACDONALD.
 FOOT CONTROL FOR GRAPHOPHONES.
 APPLICATION FILED DEC. 9, 1908.

934,450.

Patented Sept. 21, 1909.



Witnesses:
Gustave C. Thompson
M. A. Hood

Inventor
Thomas H. Macdonald
 By his Attorneys
Charles Cameron Lewis Mason

UNITED STATES PATENT OFFICE.

THOMAS H. MACDONALD, OF BRIDGEPORT, CONNECTICUT, ASSIGNOR TO AMERICAN GRAPHOPHONE COMPANY, OF BRIDGEPORT, CONNECTICUT, A CORPORATION OF WEST VIRGINIA.

FOOT CONTROL FOR GRAPHOPHONES.

934,450.

Specification of Letters Patent. Patented Sept. 21, 1909.

Application filed December 9, 1908. Serial No. 466,679.

To all whom it may concern:

Be it known that I, THOMAS H. MACDONALD, a citizen of the United States of America, and a resident of Bridgeport, Fairfield county, Connecticut, have invented a new and useful Foot Control for Graphophones, which is fully set forth in the following specification.

This invention relates to graphophones or other talking-machines used for dictation purposes, in which the operator desires from time to time to stop the running of the machine for a shorter or longer period and then to start it up again, as when he pauses to think of the right word or phrase in his dictation. This starting and stopping must be brought about instantly, and by an almost unconscious or automatic movement of the operator, whose mind and hands will be busy with other matters. This starting and stopping is commonly accomplished by a pneumatically-operated start-and-stop device, which is itself operated or controlled by a bulb of soft rubber at the end of a rubber tubing connected with the start-and-stop device (like that used in snapping the shutter of a photograph camera). The bulb lies on the floor near the operator's foot, he compresses it to stop his machine, and releases it to start it again. But as a foot-control for dictation graphophones, this soft-rubber bulb has certain objections and defects. It is by no means a slightly appendage in an office; it is liable to roll slightly away out of the reach of the operator's foot, and he has to make a conscious effort of locating it; the rubber will deteriorate after use and lose its resiliency, so that it will not expand promptly or completely upon the removal of the operator's foot, whereby the graphophone is not started up promptly or at all; the bulb will also crack and break after some use, which will render it altogether worthless for the purpose.

The object of the present invention is to provide a substitute for this soft-rubber bulb.

The invention consists of a neat, compact, substantial and durable two-part metal device, which, while easily moved around as by a thrust of the foot, will nevertheless remain stationary wherever placed; a device which will also be stable in its position, so as not to be accidentally upset; one which is above all positive, efficient, and always re-

liable in operation; one simple to construct, not liable to get out of order, easy to assemble or disassemble if desired, and slightly in appearance; and finally the object of the invention is to provide a device which, while having all the advantages already pointed out, can, at the same time, be readily operated by the tip of the operator's foot, without requiring him to hold it in position with the other foot or by hand.

The invention will be best understood by reference to the annexed drawings which show a preferred embodiment thereof.

Figure 1 is a side elevation of the device in use; Fig. 2 is a vertical section showing the two parts separated but in position for assemblage.

1 is the stationary part, and 2 the movable part. The stationary part comprises the disk-like base 3 having the roughened portion 4 where it rests upon the floor, and the cylindrical wall 5 which provides the compression-chamber 6 that is entirely open at the top.

7 is a nipple communicating with the bottom of chamber 6 and adapted to receive the end of the rubber tube 8 that leads to the start-and-stop mechanism of the graphophone (not shown).

The movable part 2 has the (rounded, and preferably roughened) head 9 from the center of which depends the massive cylindrical block 10 that fits snugly within the chamber 6 as a piston, and the concentric cylindrical apron 11 which engages snugly around the outside of wall 5; the annular space 12 (between plug 10 and apron 11) serves to receive snugly the cylindrical wall 5 of the stationary member. Preferably on the inner and outer surfaces of wall 5 is a coating of vaseline or heavy oil. In the bottom face of the block or piston 10 is the annular groove or seat 13 (preferably concentric with block 10). A coiled expansion-spring 14 rests upon the floor of chamber 6, while its upper end is seated in groove 13. The lower part of apron 11 is cut away, as at 15, so as to straddle nipple 7 when pushed down.

16 is a longitudinal guide-groove in the apron 11, to co-act with a guide-screw 17 secured in wall 5.

To assemble the parts shown in Fig. 2, screw 17 is removed, the upper end of spring 14 is inserted into seat 13, and block 10 with the spring is introduced into casing 6; then

(after forcing them down) replace the screw 17 through slot 16. To disassemble, it is only necessary to take out the screw 17. It will be further observed that except for the spring 14 there are only two parts to the entire apparatus, viz: the stationary part 1 and the movable part 2.

The operation of the device is obvious.

In order to obtain the most satisfactory results the device should not be top-heavy. The preferred construction now being put out, as illustrated in the drawings, shows the height of the entire device when assembled to be considerably less than its base. The parts are substantial and massive, comparatively heavy, in fact; so that there is no risk of tipping over or sliding along the floor or slipping from underneath the foot when the operator undertakes to press on head 9.

Of course no valve is necessary in this device, wherein it differs from a pump.

The invention is not limited to the precise construction and arrangement of parts set forth, or to the precise proportions shown and described, since these are only shown for the sake of clearness and may be varied without departing from the spirit of my invention.

Having thus described my invention, I claim:

1. A foot-control for dictation graphophones, consisting of a stationary member having a wide base and a cylindrical cham-

ber with a nipple attached thereto, a movable member comprising a massive plug fitting as a piston within said chamber and an apron fitting outside the same, and a spring interposed between the two members.

2. A foot-control for dictation graphophones, consisting of a two-part device of less height than width, the stationary member thereof having a cylindrical casing with a nipple secured thereto, the movable member thereof carrying an apron surrounding the casing and also carrying a centrally-located massive plug fitting within said casing and having an annular groove in its bottom, and a helical spring seated in said groove and resting upon the floor of said chamber.

3. A foot-control for dictation graphophones, consisting of a comparatively low and broad stationary member carrying a guide-screw and a nipple, a comparatively low and broad and heavy movable member fitting therein and having a concentric apron surrounding the same, said apron having a cut-away portion to straddle said nipple and also a guide-slot engaging said screw, and a spring interposed between said members.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

THOMAS H. MACDONALD.

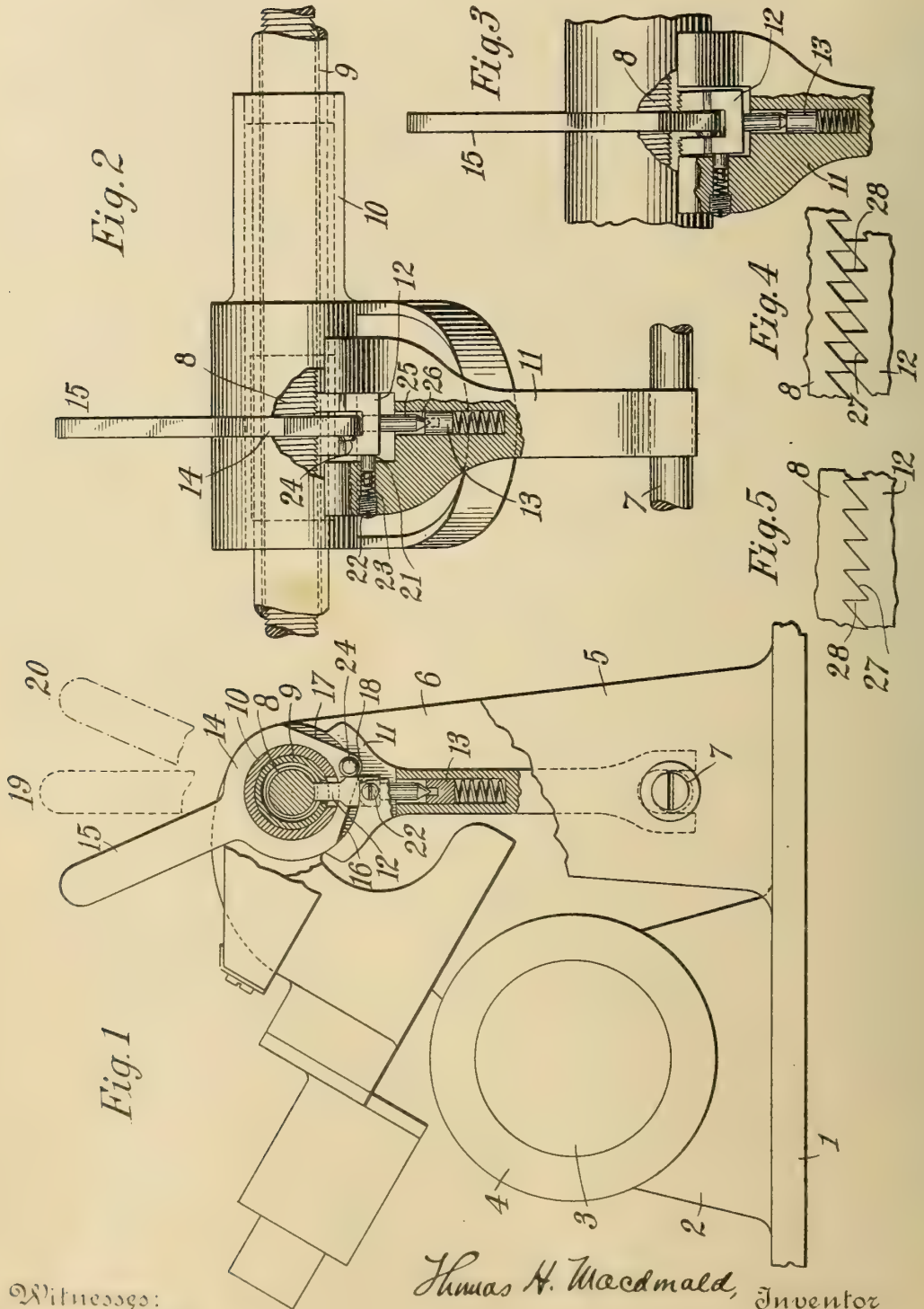
Witnesses:

A. B. KEOUGH,
L. B. NICHOLSON.

T. H. MACDONALD.
 START AND STOP MECHANISM FOR GRAPHOPHONES.
 APPLICATION FILED DEC. 14, 1908.

934,451.

Patented Sept. 21, 1909.



Witnesses:
 M. A. Wood.
 Frederick A. Holton

Thomas H. Macdonald, Inventor
 By his Attorney S.
 Mauro, Cameron Lewis & Macvie

UNITED STATES PATENT OFFICE.

THOMAS H. MACDONALD, OF BRIDGEPORT, CONNECTICUT, ASSIGNOR TO AMERICAN GRAPHOPHONE COMPANY, OF BRIDGEPORT, CONNECTICUT, A CORPORATION OF WEST VIRGINIA.

START AND STOP MECHANISM FOR GRAPHOPHONES.

934,451.

Specification of Letters Patent. Patented Sept. 21, 1909.

Application filed December 14, 1908. Serial No. 467,510.

To all whom it may concern:

Be it known that I, THOMAS H. MACDONALD, a citizen of the United States of America, and a resident of Bridgeport, Fairfield county, Connecticut, have invented a new and useful Improvement in Start and Stop Mechanism for Graphophones, which improvement is fully set forth in the following specification.

This invention relates to graphophones or other talking-machines, especially of the construction intended to operate interchangeably for recording and reproducing. In these machines there is provided a feed-screw whose thread has one side vertical and the other at an angle to the axis of the screw-shaft, and a similarly-threaded partial nut normally engaging therewith to propel the carriage longitudinally of the record; the start-and-stop mechanism has means for disengaging the nut from the screw, and for causing the two to mesh together again. In order to permit the nut to have sufficient play to permit the meshing, a certain looseness of mounting sometimes occurs, there is also a "back-lash" between the threads of the nut and those of the screw, besides rattling and other objections that will be appreciated by those familiar with the use of such machines.

The object of this invention is to provide means for preventing this back-lash, rattling, etc. without interfering with the efficiency of the machine. Preferably this is accomplished by providing means that, while the feed-nut is being brought into engagement with the feed-screw, will force the nut sidewise to the limit of its play and into proper mesh, in order to prevent the back-lash, and that will hold it there against rattle; and, in combination with this, other means for restoring the nut to its former position when disengaged from the screw.

The invention will be best understood by referring to the annexed drawings that illustrate a preferred embodiment thereof.

In these drawings, Figure 1 is an end elevation, partly in vertical section, of a graphophone showing my invention; Fig. 2 is a partly broken away rear view of a part of the same, viewed from the right in Fig. 1; Fig. 3 is a vertical section of a detail; and Figs. 4 and 5 are details on an enlarged scale.

1 is the bed-plate of the graphophone or other talking-machine; 2 is the end-standard in which is journaled the rotating mandrel 3, that carries the record-cylinder or blank cylinder 4.

5 and 6 are end-standards at the rear of the graphophone, between which is secured the lower horizontal guide-rod 7 and the feed-screw 8. Surrounding this feed-screw is the usual "split-sleeve" 9 consisting of a tubular casing having in its bottom a longitudinal slot to give access to the feed-screw. The carriage has sleeve 10 encircling and sliding upon the split-sleeve 9. The recorder or the reproducer (or the combined recorder and reproducer) will be connected to this carriage in any approved manner. Secured to the bottom of the carriage and sleeve 10 is the depending Y-shaped guide-member 11, whose lower end straddles the lower guide-rod 7. Located within the upper fork of this Y is the partial nut 12 that is normally forced upward by spring-actuated plunger 13 to enter the longitudinal slot in the split-sleeve so as to engage the threads of the feed-screw 8. This partial nut has a transverse slot in its upper face so as to render it substantially U-shaped, as seen in Figs. 2 and 3. The cam-ring 14 encircles sleeve 10 of the carriage, and its lower portion lies within the slot of the nut; it has the operating-handle 15 and is cut away at 16 and 17 on either side of the cam-nose 18.

In the position shown in Fig. 1 the nut 12 is forced upward by its plunger so as to engage the feed-screw 8; when the handle 15 is shifted in the vertical position (at 19 in Fig. 1), the cam-nose 18 on the ring forces the nut down against its spring, thereby disengaging the nut from the feed-screw, as seen in Fig. 3; and when the handle is forced still farther back (into the position indicated at 20 in Fig. 1), the nut 12 becomes again engaged with the feed screw 8. All the construction so far described is old, being illustrated, for instance, in my U. S. Letters-Patent No. 569,290, dated Oct. 13, 1896.

According to my present invention, I provide near the upper end of one of the forks of the Y-shaped guide member 11, a hole parallel to the feed-screw. Located in this hole is a plunger 21 adapted to impinge upon

the adjacent face of the nut 12; in the outer end of this hole is threaded the screw 22; and between the screw and the plunger is the coil spring 23. Upon the side of the cam-nose 18 of the cam-ring is the cam-lug or boss 24. The parts are so arranged that when the handle 15 is brought into vertical position, to disengage the feed-nut, this boss 24 enters the slot in the nut (as seen in Fig. 3) and forces the nut 12 sidewise against the plunger and spring (21 and 23); and when the handle is moved to permit meshing of the nut and feed-screw, this boss 24 clears the transverse slot and permits plunger 21 to force the nut to the extreme right (as seen in Fig. 2).

When the handle 15 is thrown into vertical position it depresses the nut 12 and disengages it from the feed-screw and at the same time the nut is being forced against the plunger 21 (as seen in Fig. 3); when the handle is shifted into the position shown in Fig. 1 (or in the position at 20 in the same figure) the plunger 13 forces the nut upward, and at the same time plunger 21 forces it to the right (as seen in Fig. 2). Thus the cam-nose 18 and the cam-lug or boss 24 coact in forcing the nut downward and to the left, while the plungers 13 and 21 coact in forcing it upward and to the right. The travel of the face of the nut 12 is diagonal; and to permit of this, the lower end of its depending stem 25 is coned, preferably at about 60° (as at 26), and rests in a seat in the top of spring-pressed plunger 13.

The purpose and advantage of imparting the diagonal movement to the feed-nut 12, when engaging and disengaging the feed-screw, is shown by reference to Figs. 4 and 5. If the nut be moved directly upward, the relation shown in Fig. 4 occurs; in this view, the sloping faces 27 of the nut 12 rest against the corresponding faces of the screw 8, while the vertical faces 28 of the respective threads are not in contact; and the screw must make a half revolution or more before it properly engages the nut to propel it. As the result the cylinder 4 is being rotated, and the recorder or reproducer is acting upon it without being immediately propelled longitudinally as it should be. The disadvantage of this will be appreciated by persons familiar with this art. But when the nut 12 is moved up in a diagonal direction, as provided by my present invention, it at once meshes properly with the threads of the feed-screw, as seen in Fig. 5. The plunger 21 provides this diagonal upward movement to cause the proper mesh; and the object of the cam-lug 24 is to restore the nut into the position from which it can subsequently receive diagonal upward movement from the plunger 21 (and the plunger 13).

I have described my invention with some particularity, but only for the sake of clear-

ness, since it is not limited to the precise details of construction and arrangements shown, and modifications may be employed without departing from the spirit of the invention, which consists of providing means to insure that the feed-nut shall be brought promptly and immediately into proper meshing relation with the feed-screw, in order to avoid any back-lash and prevent rattle, and preferably means for imparting diagonal movement to the feed-nut.

Having thus described my invention, I claim:

1. In a talking-machine, the combination with the feed-screw having threads with one side thereof vertical and the other side slanting, and the feed-nut therefor having correspondingly-shaped threads, of start-and-stop mechanism comprising means for moving the nut diagonally into mesh with the screw.

2. In a talking-machine, the combination with the feed-screw having threads with one side thereof vertical and the other side slanting, and the feed-nut therefor having correspondingly-shaped threads, of start-and-stop mechanism comprising means for moving the nut diagonally in disengaging it from the screw.

3. In a talking-machine, the combination with the feed-screw having threads with one side thereof vertical and the other side slanting, and the feed-nut therefor having correspondingly-shaped threads, of start-and-stop mechanism comprising means for moving the nut diagonally to throw it into and out of mesh with the screw.

4. In a start-and-stop mechanism for talking-machines, the combination with the feed-screw and the feed-nut and the cam-ring for forcing the same downward, of a cone-bearing depending from said nut, a spring-pressed plunger receiving said bearing and operating to move the nut upward when permitted by the cam-ring, a spring-pressed plunger impinging against the side of said nut and co-acting with the first-named plunger to move the nut diagonally upward, and a lug on the side of said cam-ring co-acting with the same to move the nut diagonally downward.

5. In a talking-machine, the combination with the feed-screw and the feed-nut, and the cam-ring and plunger for engaging and disengaging the two, said ring extending through a transverse slot in the upper face of said nut, of a lug on the side of said cam-ring adapted when entering said slot to force the nut sidewise, and an opposing spring-pressed plunger bearing against the side of said nut and adapted to force it in the opposite direction to that imparted by said lug.

6. In a start-and-stop mechanism for talking-machines, the combination with the feed-screw and the feed-nut and means for

engaging and disengaging the two, of automatic means for imparting a sidewise movement to the nut while being engaged, and automatic means for imparting a reverse
5 sidewise movement to the nut while being disengaged.

7. In a start-and-stop mechanism for talking-machines, the combination with the feed-screw and the feed-nut and means for
10 engaging the two, of automatic means for imparting a sidewise movement to the nut while being engaged.

8. In a start-and-stop mechanism for talking-machines, the combination with the
15 feed-screw and the feed-nut and means for engaging and disengaging the two, of automatic means for imparting a sidewise movement to the nut while being disengaged.

9. In a talking-machine, the combination

with the feed-screw and the feed-nut and 20 the cam-ring for engaging and disengaging the two, said ring extending through a transverse slot in the upper face of said nut, of a lug located upon the side of said ring and adapted when entering said slot to force 25 said nut sidewise.

10. In a talking-machine, the combination with the feed-screw, and the feed-nut and means for engaging and disengaging the two, of a spring-pressed plunger adapted to 30 bear against the side of said nut.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

THOMAS H. MACDONALD.

Witnesses:

L. B. NICHOLSON,

A. B. KEOUGH.



P. W. FULLER.
SOUND RECORD.
APPLICATION FILED NOV. 2, 1908.

934,601.

Patented Sept. 21, 1909.

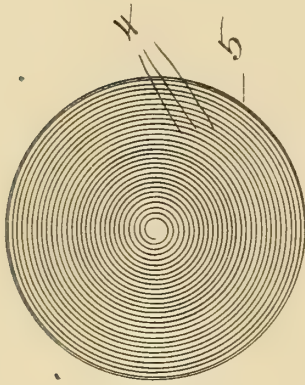


Fig. 3.

Fig. 4.

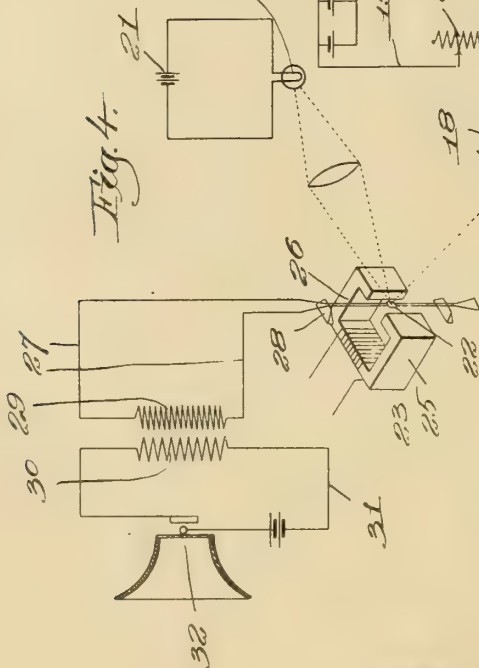


Fig. 6.

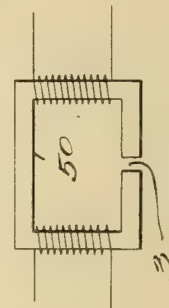


Fig. 8.

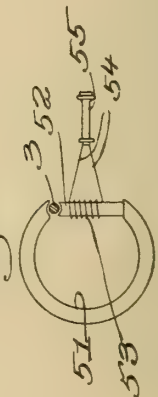


Fig. 1.



Fig. 2.



Inventor.
Percy W. Fuller,
by Lewis & Gray, attys.

Witnesses.
Thomas Drummond
Edw. L. Grant, Jr.

UNITED STATES PATENT OFFICE.

PERCY W. FULLER, OF BOSTON, MASSACHUSETTS.

SOUND-RECORD.

934,601.

Specification of Letters Patent. - Patented Sept. 21, 1909.

Application filed November 2, 1908. Serial No. 460,577.

To all whom it may concern:

Be it known that I, PERCY W. FULLER, a citizen of the United States, residing at Boston, county of Suffolk, and State of Massachusetts, have invented an Improvement in Sound-Records, of which the following description, in connection with the accompanying drawing, is a specification, like numerals on the drawing representing like parts.

There are at present two well-known ways of making permanent records of sounds. One is by making an impression or groove in a body by means of a stylus which is attached to or actuated by a diaphragm that is set in vibration by the sounds to be recorded, and the other is by locally magnetizing successive points of a body by passing said body across the poles of a magnet in which the magnetic flux is varied in accordance with the sound vibrations to be recorded.

The first method above referred to of recording sounds produces a sound record such as is made by a phonograph or graphophone, and which consists of a body having a groove or impression representing the sound vibrations; and the second method above referred to produces a magnetic sound record such as is produced by the telegraphphone.

The present invention has for its object to provide a sound record which differs from the above-mentioned sound records in that the record of the sounds is represented by a coating or deposit of material applied to a body, which coating or deposit has a characteristic that varies at different points thereof in accordance with the variations in the sound vibrations recorded. Such characteristic may be the thickness of the coating which represents intensity or amplitude of sound vibrations, or may be some other characteristic which represents pitch or quality.

The body on which the coating is applied may be a cylinder, a disk, a wire, or may have any other suitable shape or configuration, and may be made of any desired material, but will preferably be made of metal. The coating or layer which is applied thereto and which represents the sound vibrations is of a metal having magnetic properties and preferably will be one of the so-called iron group of metals. A metal like nickel which has good magnetic retentivity and can therefore be magnetized, or one like iron which has good magnetic permeability may be employed. Such coating may be applied to the

body in a variety of ways, although I prefer to apply it or deposit it on the body by the electro-plating process because by using this process the amount of metal deposited on different parts of the body and the manner of depositing it can be readily varied to correspond with variations in the sound vibrations to be recorded merely by varying the current through the electro-plating bath in accordance with the variations in such sound vibrations.

If the body on which the sound record is made is in the form of a wire, the deposit will be placed on the wire in the form of rings, the number of rings in a definite length of wire corresponding to the number of sound vibrations per unit of time, or, in other words, to the pitch of the sound record and the thickness of the rings corresponding to the amplitude of the sound vibrations or the intensity of the sound. If the body is in the form of a cylinder or plate, the deposit need not be in the form of rings but will have characteristics which vary according to the sound vibrations. When the sound record is in the form of a body having thereon a coating of magnetizable material, or material with good magnetic retentivity, such record may be made into a permanent magnetic sound record by subjecting the coated body to the action of a sufficiently strong magnetic field to magnetize the coating to saturation point, in which case there will be magnetism of different strengths at different points on the body, depending on the thickness of the coating at such points, and the sounds thus recorded can be reproduced from such a record by means of an ordinary telegraphphone-reproducing apparatus. If, on the other hand, the material of the coating deposited on the body and representing the sound vibrations, is one having good magnetic permeability but incapable of being magnetized, the sound vibrations thus recorded can be reproduced by passing the body between the poles of a magnet, one of which has associated therewith an iron core about which is wound the coils of the circuit of a telephone receiver, for when the body is thus moved relative to the magnet, the density of the magnetic flux which flows from one pole to the other will vary, depending on the thickness of the coating at different points along the body, and the variation in the flow of the magnetic flux will cause a sufficient variation of the cur

rent in the telephone receiver circuit to reproduce the sounds recorded on the body.

While there are a great variety of ways in which my improved record might be made, I have in the drawings illustrated a few ways only, such illustrations when taken in connection with the accompanying description, being sufficient to disclose fully the principle of the invention.

Referring to the drawings, Figure 1 is a view illustrating the principle of my invention when embodied in a sound record applied to a wire; Fig. 2 is a view showing the principle of my invention when the sound record is applied to a body in the form of a disk, both said Figs. 1 and 2 being more in the nature of diagrams than in the nature of actual illustrations of sound records; Fig. 3 is a plan view of a disk having my sound record applied thereto; Fig. 4 is a diagram view showing an apparatus by which my improved sound record may be formed on a wire; Fig. 5 is a diagrammatic view showing a different method of accomplishing the same end; Fig. 6 is a view showing the operation of permanently magnetizing the wire to form a magnetic sound record; Fig. 7 is a detail of the apparatus shown in Fig. 4; Fig. 8 shows diagrammatically a reproducing apparatus capable of reproducing a sound record when said record is represented by a coating of material having good magnetic permeability.

Referring to Fig. 1, 3 designates the wire or other body on which the sound record is made. The sound record is represented by a coating 4 which is applied to the body 3 and which varies in thickness at different points in accordance with the sound vibrations. Where the body is a wire, the coating or deposit 4 representing the sound record will preferably completely encircle the wire.

My improved record may also be formed on a disk 5, such as shown in Figs. 2 and 3, in which case the sound record would be in the nature of a ridge or line of material applied to or deposited on the disk in the form of a spiral, as shown in Fig. 3. Fig. 2 illustrates a section through the disk, which section is taken along the length of the line of deposit, said figure being for the purpose of illustrating the varying thickness of the coating or deposit 4. The body 3 or 5 may be of any suitable or usual material, but I will preferably use some non-magnetic material, such as copper, although other materials than copper might be successfully used, and my invention is not limited to the use of any particular substance for the body 3, 5. The material of the coating or deposit 4 may also be varied without departing from the invention, although I will preferably use either metal capable of being readily deposited by an electro-plating process and capable of being magnetized, such, for instance as nickel,

or a metal capable of being readily deposited by an electro-plating process and having good magnetic permeability, such, for instance, as iron.

In order to give a better understanding of a sound record embodying my invention, I will refer briefly to some ways in which such a record may be produced. The apparatus shown in Fig. 4 is similar to an apparatus illustrated in my co-pending application. Serial Number 430,451, filed May 2, 1908, in which I have claimed the method of making sound records. This apparatus comprises an electro-plating bath 9 through which the wire 3 is passed, said wire passing over the direction rolls 10 and 11. The arrangement shown in Fig. 4 is one adapted to deposit nickel or some similar metal on the wire 3, and 12 represents nickel anodes which dip into the electro-plating bath 9. These anodes are connected by wire 13 with a battery or other source of electricity 14, and said source of electricity is connected by a wire 15 with a selenium cell 16, said cell in turn being connected with the roll 10 by a wire 17. The circuit through the bath comprises the wire 13, anodes 12, the wire 3, roll 10, wire 17, selenium cell 16, and wire 15 (which may have a variable resistance 81 therein) back to the source of supply 14.

The selenium cell is situated at the focal point of a condensing lens 18, which lens is arranged to focus on the cell a light which varies in intensity in accordance with the sound vibrations to be recorded. As is well known, the electrical resistance of selenium varies in accordance with the amount of light to which the selenium is subjected, and by varying the amount of light which is thrown on the selenium cell 16, the amount of current which passes through the bath 9 will be varied, and, therefore, a varying amount of nickel will be deposited on the wire 3 as the latter is drawn through said bath.

There are many ways in which the intensity of the light thrown onto the selenium cell 16 may be varied to correspond with variations in the sound vibrations. The device shown in Fig. 4 makes use of a light of constant intensity, but varies the intensity of the light received by the selenium cell by means of a device known as a photographic wedge or tone chart 19, which is a transparent body having a progressively varying transparency from one portion to another. The device herein illustrated is least transparent at the center part and has the greatest transparency at the edges. Such source of constant illumination is illustrated by 20 and may be an electric light of any suitable construction connected with a battery or source of electricity 21. This light is arranged to direct a beam of light onto a mirror 22 of an oscillograph 23, the

beam of light being focused on the mirror by means of a condensing lens 24. The mirror is situated to reflect the beam of light onto the tone chart 19. The oscillograph shown may have any suitable or usual construction and herein comprises a magnet 25 between the poles of which extend the two wires 26 of a loop in a circuit 27, said wires passing over the knife edges 28 and having the mirror 22 secured thereto. The circuit 27 has in it the coils 29 of a transformer, the other coils 30 of which are in the circuit 31 of the telephone transmitter 32. When sound vibrations are received by the transmitter 32, the current in the circuit 31 will be varied in a well known manner, and the variations in this current will, through the transformer, cause similar variations in the current in the circuit 27. The mirror 22 will be deflected more or less, depending on the current variations in the circuit 27, and, therefore, the beam of light reflected from the mirror 22 will be displaced more or less on the tone chart, that depending on the character of the sound vibrations received by the telephone transmitter. The displacing of the beam of light on the tone chart results in changing the amount of light received by the selenium cell because of the varying transparency of the tone chart at different points. It will thus be seen that the current which passes through the bath of the electro-plating apparatus will vary in accordance with the variations of the sound vibrations received by the telephone transmitter, and such variations of the current through the electro-plating bath 9 will result in depositing more or less metal on the wire 3 as I have above stated.

In order to localize the deposit on the wire 3, I have shown protector tubes 33 and 34 through which the wire 3 passes and which are separated at 35 at a point within the bath so that the only portion of the wire 3 which is subjected to the action of the bath 9 is that within the space 35. With the device as herein illustrated the coating will be placed on the wire in the form of rings, the number of rings deposited per unit of time or per unit of length of wire depending on the pitch of the tone, and the thickness of the rings depending upon the intensity of the tone or amplitude of the sound vibrations.

The device shown in Fig. 4 will produce a sound record such as shown more or less diagrammatically in Fig. 1, that is, a wire body on which are deposited rings of metal of different thickness, the varying thickness of the rings representing the variations in the sound vibrations recorded.

In lieu of using the oscillograph and tone chart for varying the amount of light received by the selenium cell, I may employ the speaking arc, as shown in Fig. 5. In

this case, the speaking arc (which is of usual construction) is arranged so that a beam of light projected therefrom will be focused on the selenium cell by means of a condensing lens 41. The speaking arc comprises the two carbons 40 connected to a circuit 42 which is supplied with current from a source of current supply 43, and which may have therein a choking coil 87 and a variable resistance 82. 44 is a telephone transmitter, the circuit 45 of which has therein one coil 85 of a transformer, the other coil 86 of the transformer being in a circuit 93 which is so connected with the circuit 42 that the current of the circuit 93 will be impressed upon the current in the circuit 42.

The arc is maintained in a luminous condition by the source of electrical supply 43 and any variations in the current in the circuit 45 causes variations in the current in the circuit 93 which in turn causes a variation in the luminosity of the arc.

If the deposit or coating on the body 3 or 5 is iron, such iron coating may be deposited by the process known as acierage or steel facing. According to this process, the bath 9 is prepared by using a large sheet of iron for the anode and passing the current through the bath, which is simply a solution of sal ammoniac in water. After the current has passed through the bath for a suitable length of time, the solution becomes charged with iron and if a copper wire 3 is drawn through a bath thus prepared, an iron deposit will be formed on the wire.

Instead of using wire for the body, it is possible to use a disk such as shown in Figs. 2 and 3, in which case, of course, the electro-plating apparatus would be so arranged that the deposit would be made in the form of a line on the record.

Whenever the sound record is made by the electro-plating process, as above described, the material 4 deposited on the body will be in the form of an integral metal coating or layer.

Where the sound record is made by depositing nickel or some magnetizable material on the wire or other body, the record may be changed into a magnetic record by passing the wire between the poles of a magnet 50, as shown in Fig. 6, which is powerful enough to magnetize the magnetizable coating 4 to saturation point. When this is done, the intensity or degree of magnetism at different points along the wire will correspond to the thickness of the metal coating 4, and, therefore, a permanent magnetic record of the sound vibrations will result. The sounds thus magnetically recorded can be reproduced by means of an ordinary telegraphophone-reproducing apparatus which it is not necessary to illustrate herein. If, on the other hand, the coating which is applied to the wire or other body is of iron

which has good magnetic permeability, the sound record will be completed when the deposit is made. The sounds thus recorded may be reproduced by passing the wire or other body between the poles of a magnet 51, one of the poles of which magnet has associated therewith an iron core 52 about which are wound the coils 53 of the circuit 54 of a telephone receiver 55. The density of the magnetic flux which flows from one pole to the other depends on the thickness of the iron coating on the wire, and, therefore, as the wire is drawn between the poles, a varying current will be set up in the circuit 54 which will cause a reproduction of the sound vibrations by means of the receiver 55.

In the above I have not attempted to illustrate all the ways in which a sound record embodying my invention might be made, nor all the forms such a sound record might assume. What has been shown and described is sufficient, however, to illustrate the principle of the invention which is expressed in the following claims.

Having fully described my invention, what I claim as new and desire to secure by Letters Patent is:—

1. A sound record comprising a body having thereon an integral coating or layer of magnetized metal, which coating or layer has a characteristic other than its magnetic characteristic that varies to represent variations in sound vibrations.

2. A sound record comprising a body having placed thereon an integral coating or layer of one of the metals of the iron group which varies in thickness at different points to represent variations in sound vibrations.

3. A sound record comprising a body having deposited thereon so as to be in intimate and permanent contact therewith a layer or coating of one of the metals of the iron group, which layer or coating varies in thickness to represent variations in sound vibrations.

4. A sound record comprising an integral layer or coating of one of the metals of the iron group which varies in thickness at different points to represent the variations in the sound vibrations of which the layer constitutes a record.

5. A sound record comprising a body having thereon an electrolytically-deposited layer or coating of magnetized metal, which

layer or coating has a non-magnetic characteristic that varies to represent the variations in the sound vibrations recorded.

6. A sound record comprising a body having deposited thereon by electric action a coating or layer of one of the metals of the iron group, which layer or coating varies in thickness at different points to represent variations in sound vibrations.

7. A sound record comprising a body of non-magnetizable material having deposited thereon an integral coating or layer of metal which varies in thickness at different points to represent variations in sound vibrations.

8. A sound record comprising a body of non-magnetic material having deposited thereon by electric action an integral coating of metal which varies in thickness at different points to represent variations in sound vibrations.

9. A sound record comprising a body having deposited thereon by the electro-plating process an integral coating or layer of metal having magnetic properties, which coating or layer varies in thickness at different points to represent variations in sound vibrations.

10. A sound record comprising a body having thereon an integral coating or layer of metal having magnetic properties, which coating or layer has a characteristic other than a magnetic characteristic to represent variations in sound vibrations.

11. A sound record comprising an integral layer or coating of magnetized metal which varies in thickness at different points to represent variations in the sound vibrations of which the layer constitutes a record.

12. A sound record comprising a body having deposited thereon a coating or layer of metal magnetized to saturation point, which layer or coating varies in thickness at different points to represent variations in sound vibrations.

13. A sound record comprising a wire having a cross-wire corrugated magnetic face with the different corrugations varying in size to correspond to variations in the sound vibrations recorded.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

PERCY W. FULLER.

Witnesses:

LOUIS C. SMITH,

THOMAS J. DRUMMOND.

UNITED STATES PATENT OFFICE.

WILLIAM T. LONG, OF SUMNER, WASHINGTON.

RECORD-HOLDER.

935,379.

Specification of Letters Patent. Patented Sept. 28, 1909.

Application filed January 29, 1909. Serial No. 475,040.

To all whom it may concern:

Be it known that I, WILLIAM T. LONG, a citizen of the United States, and a resident of Sumner, in the county of Pierce and State of Washington, have invented a new and Improved Record-Holder, of which the following is a full, clear, and exact description.

The invention relates to phonographs, and its object is to provide a new and improved record^{*}holder arranged to accurately and securely hold the record in central position, to accommodate records of different sizes, to compensate for variations of the inside diameter of the records, to hold the record against accidental shifting in an axial direction and to allow placing the record conveniently in position on the holder or removing it therefrom. For the purpose mentioned, the holder is provided with a plurality of bars for engagement with the inner surface of the record and mounted to swing in unison toward and from the axis of the holder, the bars being pressed in an outward direction by a spring device.

A practical embodiment of the invention is represented in the accompanying drawings forming part of this specification and in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 is a side elevation of the improvement; Fig. 2 is a longitudinal central section of the same and showing the record in place; and Fig. 3 is a front end elevation of the same.

The usual feed shaft A, of a phonograph extends through a tube B, secured centrally to the feed shaft A by set screws C, preferably screwing in heads B', B² secured or formed on the ends of the tube B. By the use of the set screws C the tube B can be accurately centered on the feed shaft A, and as the inside diameter of the tube B is somewhat in excess of the diameter of the feed shaft A, it is evident that the tube B can be readily fitted on feed shafts varying slightly in diameter.

The heads B', B², are pivotally connected by sets of links D, D', with lugs E, E', attached to or formed on the inner faces of longitudinally-extending bars F, adapted to engage with their outer faces the inner sur-

face of the cylindrical phonograph record G, to support the latter centrally relative to the axis of the feed shaft A. The rear ends of the bars F are provided with outwardly-extending integral stop lugs F', in engagement with the rear end of the phonograph record G to limit the rearward movement thereof, and the forward ends of the said bars F are provided with humps F², for engagement with the forward ends of the phonograph record G to hold the record against accidental outward movement, said bars having inwardly bent terminals F³. Thus when the phonograph record is in position on the bars F, it is held against movement in a longitudinal direction.

On the inner faces of the bars F and at points intermediate the sets of lugs E, E', is arranged another set of lugs E², provided with transverse pins E³, engaging slotted arms H', formed or secured on a sleeve H, mounted to slide at its forward end on the tube B, and at its rear end on a collar I, held on the tube B and abutting against the head B². A spring J is coiled on the tube B within the sleeve H and rests with its rear end on the collar I, the forward end of the spring pressing against the forward end of the sleeve H to move the sleeve H in a forward direction, the movement of the sleeve H in this direction being limited by a stop collar K, held adjustably on the tube B by a set screw K'.

Phonograph records G, as now usually constructed, have a tapering bore; that is, the rear end is larger in diameter than the front end, and in order to insure contact of the bars F throughout their length with the inner tapering wall of the record G, it is necessary that the bars F be correspondingly inclined, as plainly shown in Figs. 1 and 2.

When the holder is in position on the feed shaft A, as shown in Fig. 1, and it is desired to place a record G in position on the arms F, the operator places the rear end of the record against the terminals F³ of the arms F, as indicated in dotted lines in Fig. 1, and then pushes the record in the direction of the arrow a', so that the arms F are caused to swing rearward and inward to allow the record to pass the humps F², the record finally abutting with its rear end against the

stop lugs F' , and at the time the humps F^2 have passed out of the front end of the record and now abut against the front end of this record. When the arms F are caused to

5 swing rearward and inward, as above described, the pins E^3 act on the arms H' to move the sleeve H in a rearward direction against the tension of the spring J , and when the record reaches its final position on the
10 arms F and the operator releases the record G , then the pressure exerted by the spring J against the sleeve H in a forward direction causes the arms H' of the sleeve to press against the pins E^3 and lugs E^2 in a like di-
15 rection, thus forcing the bars F in firm contact with the inner surface of the record G and thereby cause the record G to turn with the holder fastened to and turning with the feed screw A . When it is desired to remove
20 the record G , the operator takes hold of the record and pushes the same toward the right in the inverse direction of the arrow a' , to cause the forward end to act on the humps F^2 with a view to swing the bars F inward
25 at their forward ends, the links D permitting such movement. The record is now readily slipped off the holder and the arms F swing outward to their full extent by the action of the spring J on the sleeve H , the movement
30 of which and that of the bars F , being finally limited by the sleeve H abutting against the stop collar K .

The bars F are preferably curved at their outer faces to conform to the inner surface
35 of the records, thus providing a large gripping surface to hold the records against turning on the bars. As the arms F are mounted to swing bodily toward and from the axis of the feed shaft A and the arms are
40 normally held in an outermost position by the action of the spring-pressed sleeve H , it is evident that the arms readily yield bodily to permit of placing the records gently
45 in position or removing the same therefrom, and hence all injury to the records is completely avoided and the holder readily accommodates records of different sized bores.

Having thus described my invention, I claim as new and desire to secure by Letters
50 Patent:

1. A holder for phonograph records, comprising a plurality of longitudinal bars mounted to swing toward and from the axis of the holder, means whereby the movement
55 of the bars longitudinally in one direction will move them toward the axis of the holder, and spring pressed means for returning the bars.

2. A holder for phonograph records, comprising in combination with the feed shaft, a plurality of bars arranged longitudinally
60 of the shaft and mounted for movement toward and from the shaft, means whereby

a bodily movement of the bars longitudinally of the shaft in one direction will swing them
65 toward the shaft and a spring for returning the bars.

3. The combination with the feed shaft of the phonograph, of a holder for the records comprising a plurality of longitudinal bars,
70 means for mounting the bars to permit them to move radially with respect to the shaft and longitudinally thereof, means whereby the longitudinal movement in one direction will move the bars toward the shaft and a
75 spring for returning the bars.

4. The combination with the feed shaft of the phonograph, of a holder for the records comprising a tube for attachment to the shaft, a plurality of longitudinal bars, links
80 pivotally connecting the bars with the tubes, a sleeve slidable on the tube and having a connection with the bars for moving said bars in the same direction with the tube, and a spring for returning the tube.
85

5. A holder for phonograph records, comprising a tube for attachment to the feed shaft of the phonograph, longitudinal bars grouped around the said tube, links pivotally
90 connecting the said tube with the said bars, a spring-pressed sleeve mounted to slide on the said tube, and provided with radially extending slotted arms, and pins on the bars engaging the slots in the said sleeve arms.
95

6. A holder for phonograph records, comprising a tube for attachment to the feed shaft of the phonograph, longitudinal bars grouped around the said tube, links pivotally
100 connecting the said tube with the said bars, a spring-pressed sleeve mounted to slide on the said tube, and provided with radially extending slotted arms, pins on the bars engaging the slots in the said sleeve arms, and a collar adjustably secured on the said tube
105 for limiting the sliding movement of the said sleeve.

7. In combination with a phonograph feed shaft, of a tube for the passage of the said feed shaft, set screws for fastening the tube centrally to the said feed shaft, bars grouped
110 around the said tube, sets of links pivotally connecting the bars with the said tube, and a spring-pressed sleeve mounted to slide on the said tube and having a pivotal connection with the said bars at points intermediate
115 the said sets of links.

8. A holder for phonograph records, provided with a plurality of longitudinal bars grouped around the axis of the holder and mounted to swing simultaneously toward
120 and from the said axis and means for mounting the bars whereby to permit them to tilt on their longitudinal axis toward and from the axis of the holder.

9. A holder for phonograph records, provided with a plurality of longitudinal bars
125

grouped around the axis of the holder and
mounted to swing simultaneously toward
and from the said axis, each of the bars be-
ing provided at one end with an outwardly-
5 extending stop lug and at the other end with
an integral hump having an inwardly-bent
terminal.

In testimony whereof I have signed my
name to this specification in the presence of
two subscribing witnesses.

WILLIAM T. LONG.

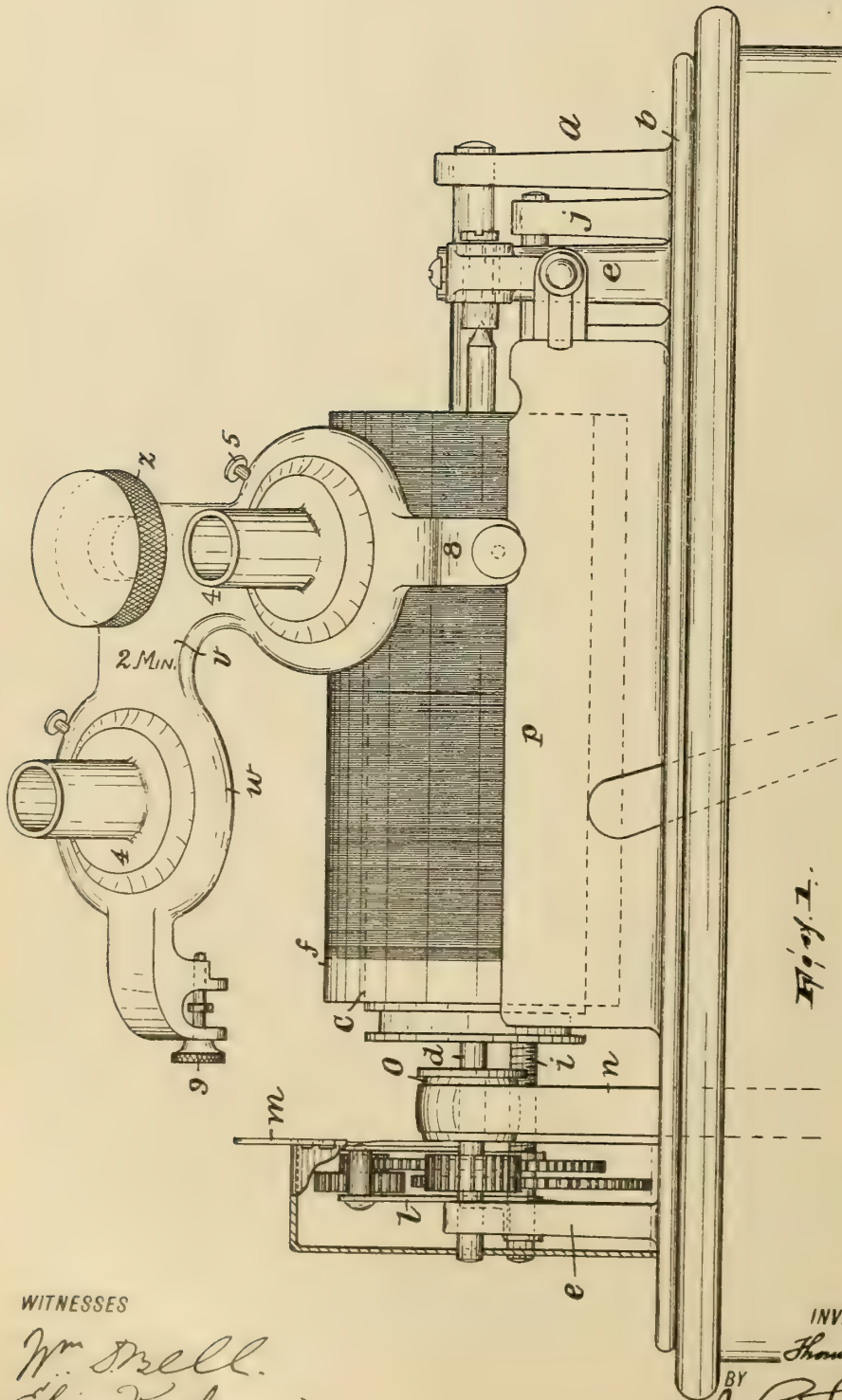
Witnesses:

R. R. WHITE,
F. M. BROWN.

T. J. BLANCH.
 PHONOGRAPH MACHINE.
 APPLICATION FILED JAN. 7, 1909.

935,773.

Patented Oct. 5, 1909.
 2 SHEETS—SHEET 1.



WITNESSES

Wm. Dell.
 Elie Kaufmann.

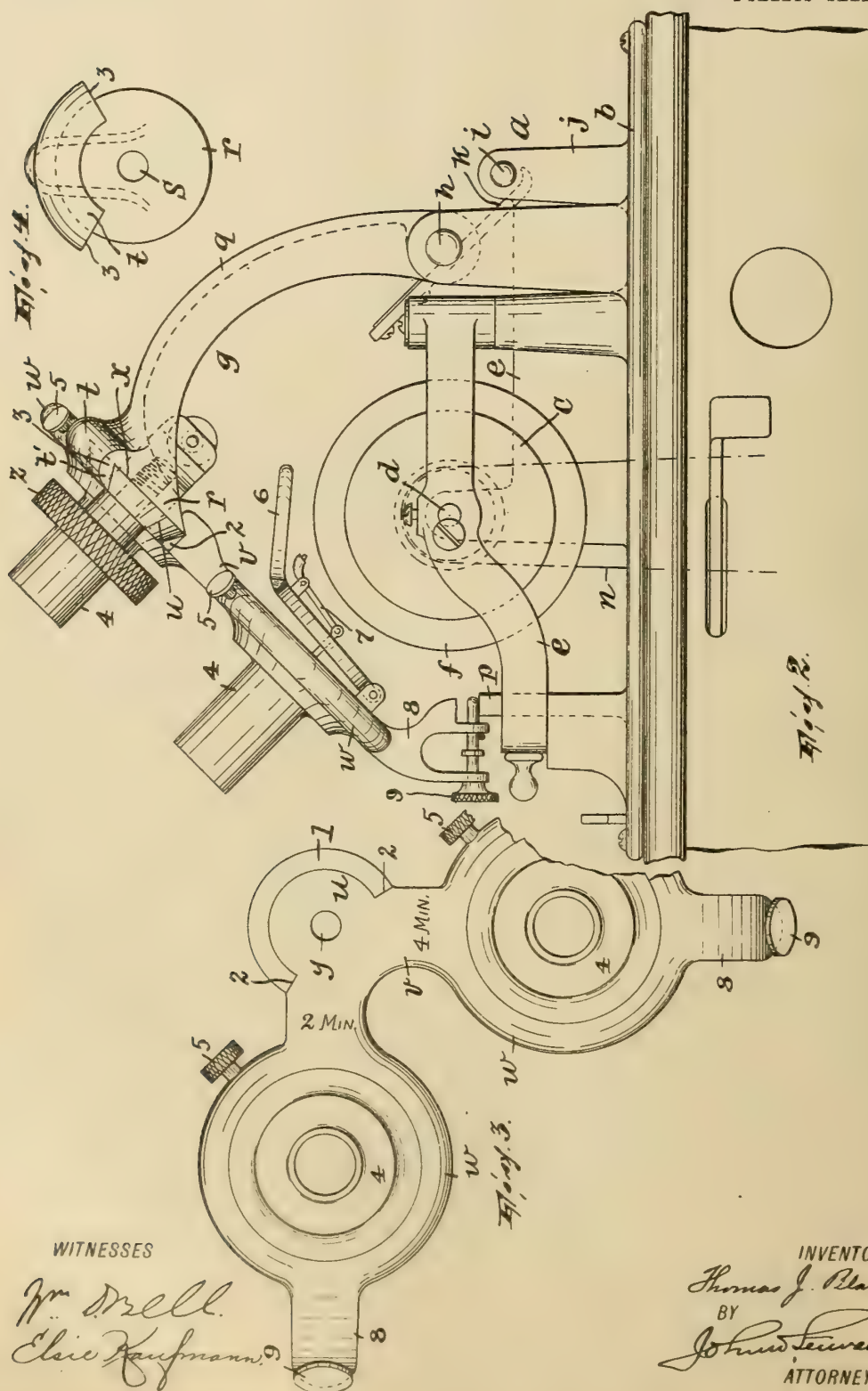
INVENTOR,
 Thomas J. Blanch.
 BY
 John L. Leonard,
 ATTORNEY.

T. J. BLANCH.
 PHONOGRAPH MACHINE.
 APPLICATION FILED JAN. 7, 1909.

935,773.

Patented Oct. 5, 1909.

2 SHEETS—SHEET 2.



UNITED STATES PATENT OFFICE.

THOMAS J. BLANCH, OF HIGHLAND FALLS, NEW YORK.

PHONOGRAPH-MACHINE.

935,773.

Specification of Letters Patent.

Patented Oct. 5, 1909.

Application filed January 7, 1909. Serial No. 471,147.

To all whom it may concern:

Be it known that I, THOMAS J. BLANCH, a citizen of the United States, residing in Highland Falls, Orange county, New York, have invented certain new and useful Improvements in Phonograph-Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to characters of reference marked thereon, which form a part of this specification.

This invention relates to phonograph machines, and particularly to that class of such machines in which are used cylindrical records, and it has for its object to provide a practical and novel construction of carriage or slide whereby either of two reproducers or "speakers" arranged therein may be quickly and readily thrown into, and the other out of, working position relatively to the record.

It being predicated that there are now in use two general kinds of records, to wit, one having one number of threads to the inch, say 100, and the other having another number of threads to the inch, say 200, and that these two kinds of records require distinct kinds of styluses, the advantages gained in associating the two different speakers or reproducers in a single structure so that the change from the one to the other may be accomplished quickly and conveniently will be apparent.

In the accompanying drawings, in which my invention is fully illustrated, Figure 1 is a front view of a phonograph machine constructed in accordance with this invention; Fig. 2 is a side view thereof; Fig. 3 shows the pivoted reproducer support in plan; and, Fig. 4 is a plan of the end of the arm of the carriage or slide.

a in the drawings designates an Edison phonograph machine, *b* being its base, *c* its mandrel having its shaft *d* journaled in the brackets *e*, *f* the cylindrical record, *g* the carriage pivoted and also movable laterally on the guide *h*, *i* the rotating feed-screw journaled in brackets *e* and *j* (the feed-screw being adapted to be engaged by the arm *k* of the carriage when the latter is lowered to its extreme or working limit), *l* a change-speed transmission mechanism connecting the shaft *d* with the screw *i* and *m* its con-

trolling lever, and *n* and *o* the belt and pulley for transmitting power to shaft *d*; *p* designates the auxiliary carriage guide. The arm *q* of the carriage is or may be constructed substantially as such part is now commonly constructed, except at the end thereof I provide a substantially circular table or bearing *r* having a screw-hole *s* formed centrally therein with its axis lying approximately in a radius from the axis of the guide *h* which, as usual, is parallel with the mandrel shaft; said bearing or table has at the back thereof, integral with the arm, an arc-shaped abutment *t* formed concentric with the bearing and having the side thereof adjoining the bearing cut back at an acute angle with reference to the face of the bearing, thereby producing an overhang *t'*. Against this bearing contacts the bearing-portion *u* of the reproducer supporting member *v*, comprising said bearing portion and the open or annular arms *w* extending in directions at right angles to each other from the bearing portion. The bearing portion is formed with an under face *x* adapted to lie in square contact with the bearing or table of arm *q* and it has a hole *y* which receives a screw *z* having a milled head whereby the supporting member may be firmly secured in either of its two limits of motion on the screw as a pivot. The bearing-portion *u* has an arc-shaped peripheral portion of the same radius as the overhang *t'*, such portion (1) being beveled so as to contact squarely with the inner inclined face of the overhang. The arms *w* are formed with shoulders 2 adapted to contact with the shoulders 3 formed at the ends of the abutment *t*.

The arms *w* are adapted to receive the speakers or reproducers 4 which may be held therein by the set-screws 5, said speakers having different types of styluses so that either of the records referred to may be used in the machine when desired. These speakers or reproducers are preferably provided with so-called tail-weights 6 controlling their stylus arms 7. Each arm has an extension 8 carrying a longitudinally movable detent 9 which when pressed in rests on the auxiliary guide *p* and supports the carriage at the front, and which when drawn out allows the carriage to fall so that the extension bears directly against said guide in the working position of the carriage. I preferably inscribe on each of the arms *w* suitable mark-

ings such as "4-minute" and "2-minute" so that the operator can see at a glance that the proper stylus for the record at that time on the mandrel is in position. The speed-controlling lever *m* also has adjoining it markings of a similar import.

In use, it will be understood that the reproducer support is provided with reproducers having the two different kinds of styluses, as indicated. If a record of the four-minute kind is placed on the mandrel, the controlling lever *m* is moved to the four-minute position and member *v* is shifted to bring the arm marked "4-minute" or otherwise squarely in vertical disposition whereby the reproducer of that arm is in proper alinement with the record while the reproducer of the other arm is entirely out of position; at this time the shoulders 2 and 3 will be in contact. If a record of the two-minute kind is now placed on the mandrel, the controlling lever and reproducer supporting member *v* are simply shifted to their other limits of movement. The plane of movement of the supporting member *v* being at right angles to a line approximating a radius from the guide *h*, which is parallel to the mandrel shaft, the raising and lowering of the carriage on the guide as an axis can be effected without the styluses engaging the record and damaging it or themselves or disturbing their adjustment. Further, the peculiar bearing afforded between the arm and member *v* insures against any disturbance of the proper relative positions of these parts, effecting, as such change in their relation would, an undesirable alteration of the point of contact of the stylus with the record.

By arranging the arms *w* of the member *v* at substantially right angles to each other it is found that the tail-weights are perfectly free to act without the one which is for the time being idle interfering with the proper action of the other.

It will be understood that any other suitable form of device corresponding to the screw *z* may be employed in the place of such screw.

Having thus fully described my invention, what I claim and desire to secure by Letters Patent is:

1. In a carriage for a reproducer or reproducers in a phonograph machine, the combination of an arm, and a reproducer supporting member pivoted in said arm, said arm and the supporting member having an interlocking portion confining the supporting member against axial movement in the arm, substantially as described.

2. In a carriage for reproducers in a phonograph machine, the combination of an arm, and a reproducer supporting member having reproducer receiving portions off-set with relation to each other, said member

being pivoted in the arm, and the arm and the supporting member having an interlocking portion confining the supporting member against axial movement in the arm, substantially as described.

3. In a carriage for a reproducer or reproducers in a phonograph machine, the combination of an arm, and a reproducer supporting member pivoted in said arm, said arm and the supporting member having a tongue-and-groove connection confining the supporting member against axial movement in the arm, substantially as described.

4. In a carriage for a reproducer or reproducers in a phonograph machine, the combination of an arm having a bearing seat at its free end, and a reproducer supporting member pivoted in said arm in contact with the seat thereof, said arm and the supporting member having tongue-and-groove connection confining the supporting member against axial movement in the arm, substantially as described.

5. In a carriage for a reproducer or reproducers in a phonograph machine, the combination of an arm having a bearing seat at its free end, a reproducer supporting member arranged in pivotal contact with said seat, and a screw affording the pivot for said member and clamping the same against the seat, said arm and the supporting member having tongue-and-groove connection confining the supporting member against axial movement in the arm, substantially as described.

6. In a carriage for a reproducer or reproducers in a phonograph machine, the combination of an arm having a bearing at its free end, and a reproducer supporting member having a bearing portion and pivoted to the arm with its bearing portion in contact with the bearing of said arm, said bearing portion having a part of its periphery concentric with the pivot of said member and said bearing having an overhang overlying the concentric peripheral part of said bearing portion, substantially as described.

7. In a carriage for a reproducer or reproducers in a phonograph machine, the combination of an arm having a bearing formed with an overhang, and a reproducer supporting member having a bearing portion and pivoted to the arm with its bearing portion in contact with the bearing of said arm, said overhang and a part of the periphery of said bearing portion affording surfaces contacting with each other and concentric with the pivot of said member, substantially as described.

8. In a carriage for a reproducer or reproducers in a phonograph machine, the combination of an arm having a bearing at its free end, and a reproducer supporting member having a bearing portion and pivoted to the arm with its bearing portion in contact

70

75

80

85

90

95

100

105

110

115

120

125

130

with the bearing of said arm, said bearing having an overhang overlying the bearing portion of said member and forming a stop limiting the pivotal movement of said member, substantially as described.

9. In a carriage for reproducers in a phonograph machine, the combination of an arm, and a reproducer supporting member pivoted in said arm and having its reproducer-receiving portions disposed substantially at right angles to each other and being limited by the arm to move pivotally

through approximately 90 degrees, said arm and the supporting member having interlocking portions confining the supporting member against axial movement in the arm, substantially as described.

In testimony, that I claim the foregoing, I have hereunto set my hand this 5th day of January, 1909.

THOMAS J. BLANCH.

Witnesses:

JOHN W. STEWARD,

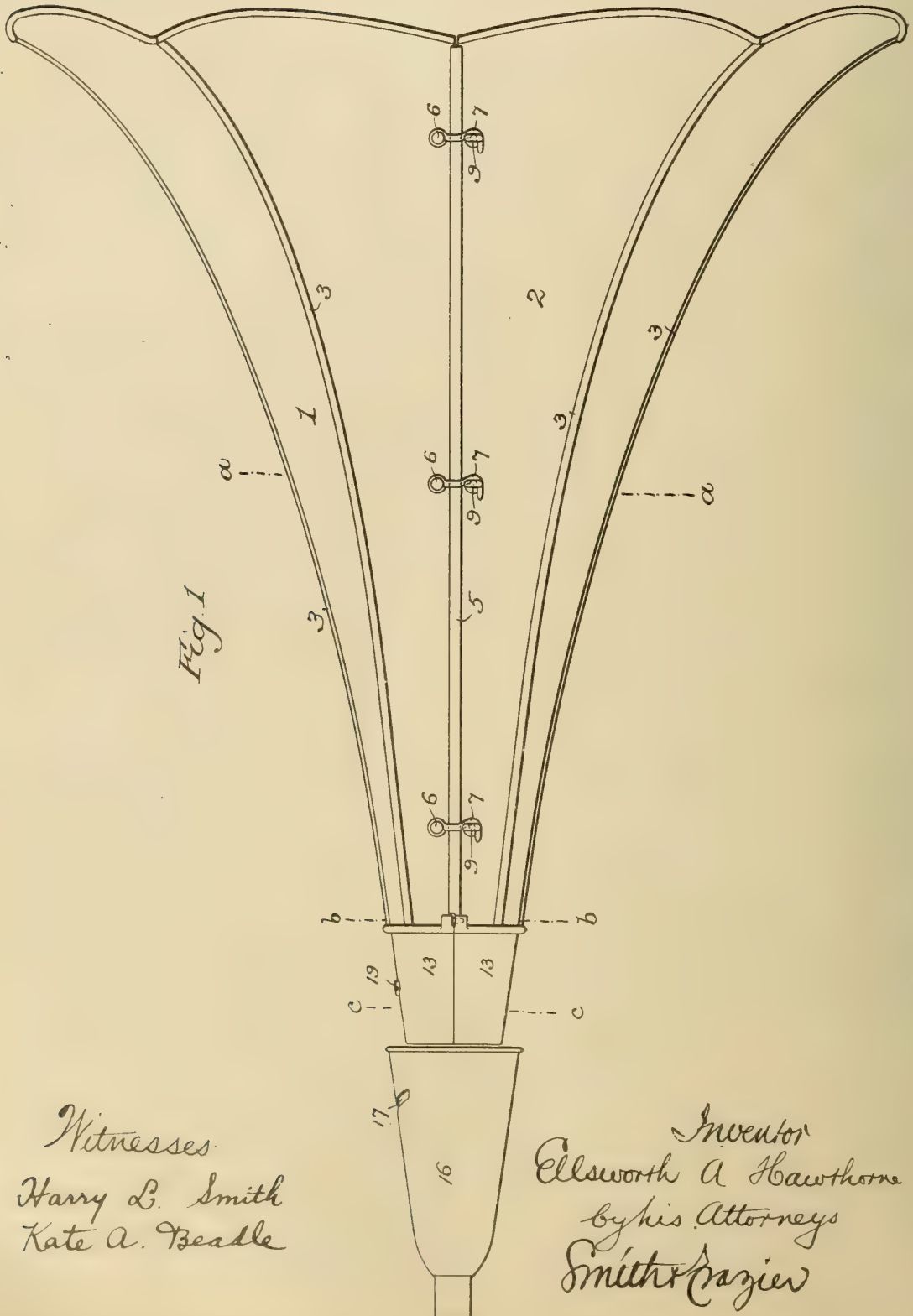
WM. D. BELL.

E. A. HAWTHORNE.
SECTIONAL HORN FOR TALKING MACHINES.
APPLICATION FILED JULY 15, 1907.

935,980.

Patented Oct. 5, 1909.

2 SHEETS—SHEET 1.



Witnesses
Harry L. Smith
Kate A. Beadle

Inventor
Elsworth A Hawthorne
by his Attorneys
Smith & Pajew

E. A. HAWTHORNE.
SECTIONAL HORN FOR TALKING MACHINES.
APPLICATION FILED JULY 16, 1907.

935,980.

Patented Oct. 5, 1909.

2 SHEETS—SHEET 2.

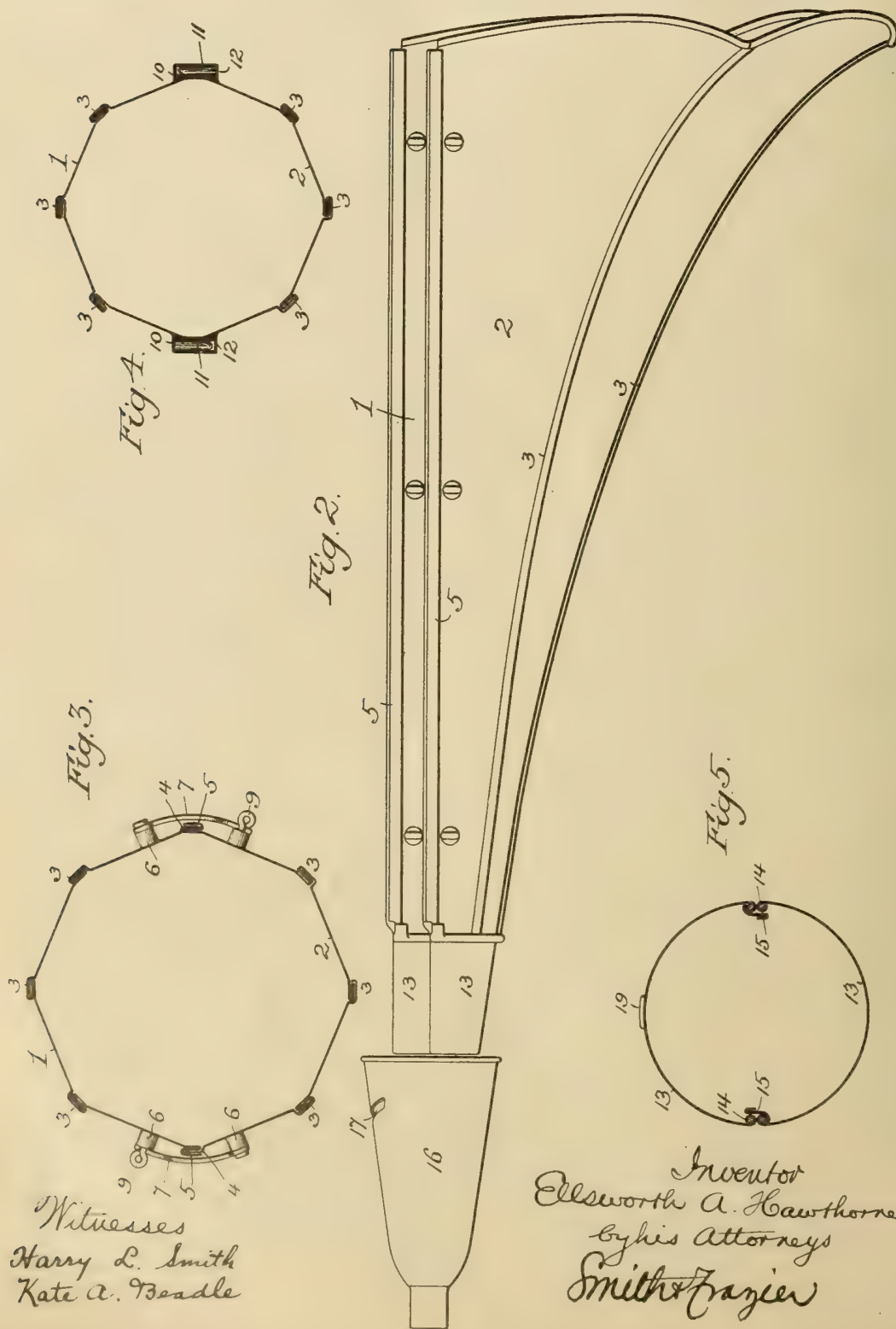


Fig. 2.

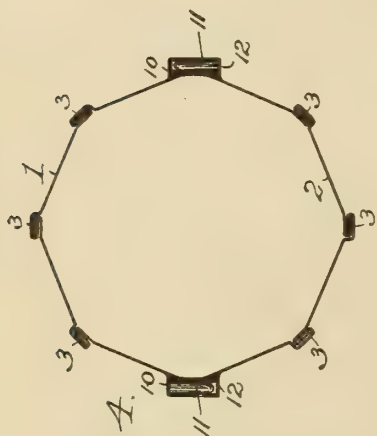


Fig. 4.

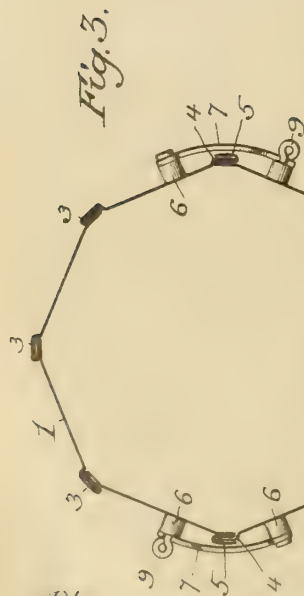


Fig. 3.

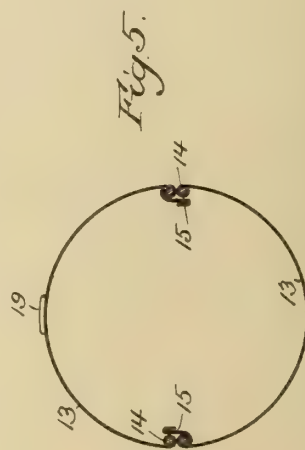


Fig. 5.

Witnesses
Harry L. Smith
Kate A. Beadle

Inventor
Elsworth A. Hawthorne
by his Attorneys
Smith & Frasier

UNITED STATES PATENT OFFICE.

ELLSWORTH A. HAWTHORNE, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO HAWTHORNE & SHEBLE MANUFACTURING COMPANY, OF PHILADELPHIA, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

SECTIONAL HORN FOR TALKING-MACHINES.

935,980.

Specification of Letters Patent.

Patented Oct. 5, 1909.

Application filed July 15, 1907. Serial No. 383,736.

To all whom it may concern:

Be it known that I, ELLSWORTH A. HAWTHORNE, a citizen of the United States, residing in Philadelphia, Pennsylvania, have
5 invented certain Improvements in Sectional Horns for Talking-Machines, of which the following is a specification.

My invention relates to sectional horns such as are sometimes used in connection
10 with talking machines, the object of making the horn in sections being to permit of its being taken apart and packed for transportation or storage in smaller space than would be occupied by the complete horn.

One object of my invention is to so construct such a horn that its parts can be easily fitted together and taken apart, and, when so fitted together, will be rigidly held in their proper relation one to another; a
20 further object being to so construct the sectional members of the horn that when they are fitted together, the horn will present, both interiorly and exteriorly, a symmetrical appearance.

In the accompanying drawings:—Figure 1 is a side elevation of my improved sectional horn showing the members of the same fitted together for use, but illustrating the mouth
25 piece detached from the bell portion of the horn; Fig. 2 is a similar view illustrating the sections of the horn detached from one another, and fitted one within the other; Fig. 3 is a transverse section on the line
30 *a—*a**, Fig. 1; Fig. 4 is a transverse section on the line *b—b*, Fig. 1, but on an enlarged scale, and Fig. 5 is a transverse section on the line *c—c*, Fig. 1, likewise on an enlarged scale.

I have, in the present instance, illustrated
40 my invention as embodied in a horn having a bell portion of octagonal cross section, although the invention is applicable to horns of other contour in cross section. The bell portion of the horn is composed of two
45 sections 1 and 2, each of which may consist of a single piece if desired, although as shown each consists of four strips secured together by interlocked joints 3. Where the sections join each other on each side of the
50 horn an equivalent of the joints 3 is produced by providing the edges of the sections with projecting flanges 4 and sockets 5 for the reception of said flanges, as shown in

Fig. 3, each flange being slightly offset from the member on which it is formed, so as to
55 accommodate the inner wall of the corresponding socket 5, and thus preserve the symmetry of the interior surface of the horn. Each section of the horn has, at each side a series of projecting lugs 6, and to each lug
60 of one section of the horn is fastened a swinging hook 7 which engages with a catch 9 on the corresponding lug of the other section in order to lock the two sections of the horn in their proper relation one to another.

In order to insure the proper registry of the two sections at the mouth piece end of the trumpet, each section is, at that point, thickened on each side as shown at 10, in
65 Fig. 4, two of these thickened portions 70 carrying dowel pins 11 which enter sockets 12 in the other thickened portions. At the mouth piece end of the horn the bell portion of each section has a projecting semi-circular extension 13, each of these extensions
75 having its edge portion stiffened by means of a wire 14 as shown in Fig. 5, and one edge of each extension has a projecting flange 15 overlapping the reinforced edge of the other section, this construction also serving
80 to maintain the two sections in proper registry with one another.

The mouth piece consists of a flaring tube 16 adapted to fit over the nozzle formed by the projections 13, and having in one side
85 an inclined slot 17 which engages a projecting lug 19 on a corresponding portion of the nozzle so as to lock the mouth piece in engagement therewith, when it is properly
90 adjusted upon the nozzle, ready application or removal of the mouth piece being thereby provided for. The slot 17 and lug 19 constitute, in effect, part of a screw threaded connection and a complete thread may be
95 used if desired.

When the two sections of the horn are disconnected they may be fitted one within the other as shown in Fig. 2 so as to occupy
100 much less space than the complete horn, and when the parts of the horn are thus fitted together, they can be conveniently packed in a trunk or sample case.

I claim:

1. A horn for talking machines composed of sections each consisting of a series of
105 strips rigidly united at their edges by means

of interlocked joints, the sections abutting at their edges, and being secured together by means of external, separable fastenings.

2. A horn for talking machines composed of sections each consisting of a series of strips having their meeting edges rigidly connected by means of interlocked joints, the edges of the sections engaging by means of a socket on one section and a flange on the other section entering said socket, and the sections being secured together by means of external, separable fastenings.

3. A horn for talking machines composed of sections each comprising a bell member and a mouth piece or nozzle member, said sections having abutting edges, and the edges of the nozzle member being rolled and provided with internal stiffening wires.

4. A horn for talking machines composed of sections each comprising a bell member and a mouth piece or nozzle member, said

sections having abutting edges, and the edges of the nozzle member being rolled and provided with internal stiffening wires, one of said edges having a projecting flange bearing upon the inside of the rolled and stiffened edge of the other section.

5. A horn for talking machines composed of laterally separable sections, each comprising a bell member and a nozzle member, said sections abutting at the edges, and the nozzle member having an external detachable mouth piece which serves to retain the laterally separable sections of the said nozzle member in contact with one another.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

ELLSWORTH A. HAWTHORNE.

Witnesses:

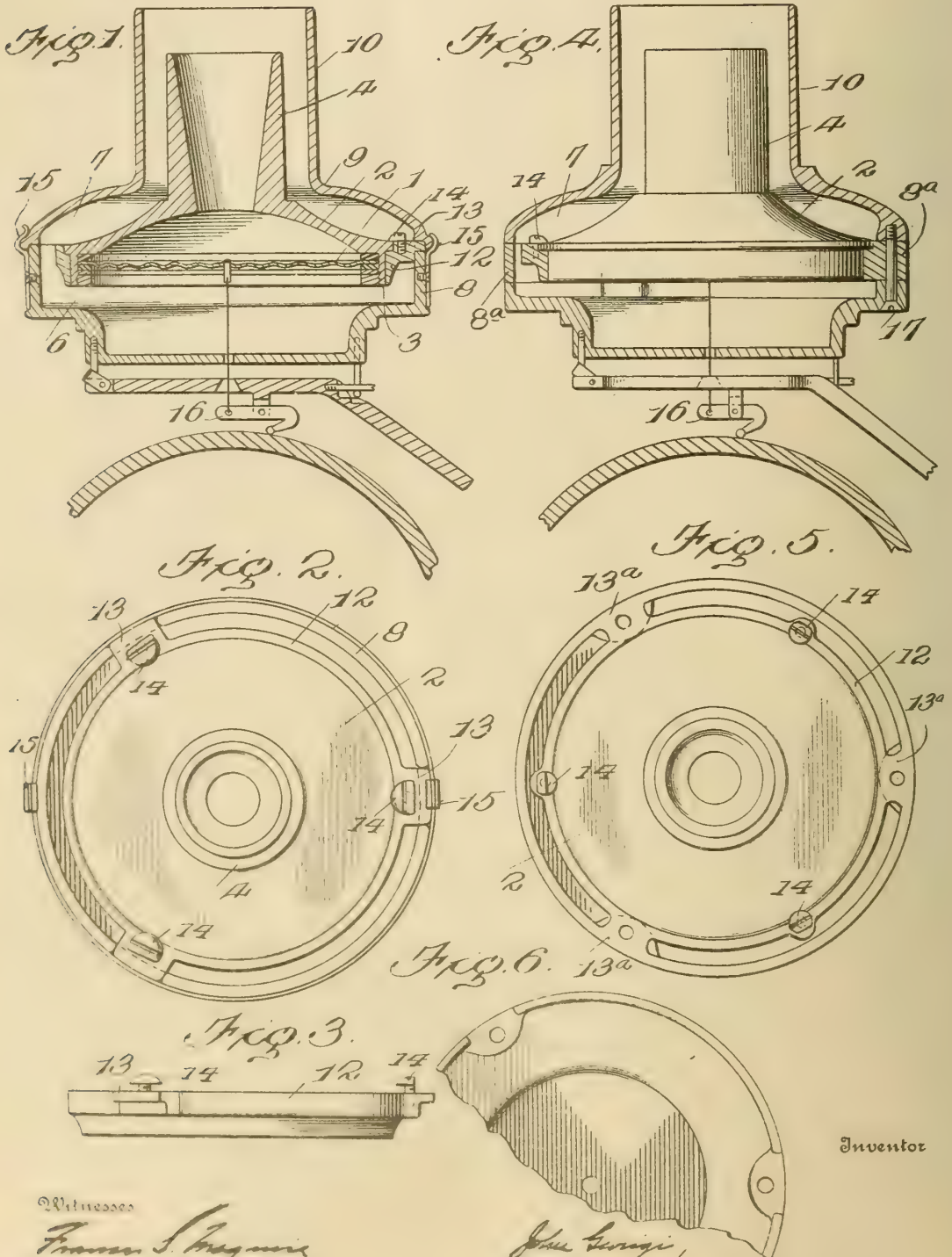
H. MEIER.

HIRAM SHIEBLE.

J. GEORIGI.
ATTACHMENT FOR PHONOGRAPHS.
APPLICATION FILED NOV. 7, 1908.

936,115.

Patented Oct. 5, 1909.



Inventor

Witnesses
Francis S. McGuire
John A. Murphy

John Georgi,
Attorney

UNITED STATES PATENT OFFICE.

JOHN GEORIGI, OF PHILADELPHIA, PENNSYLVANIA.

ATTACHMENT FOR PHONOGRAPHS.

936,115.

Specification of Letters Patent.

Patented Oct. 5, 1909.

Application filed November 7, 1908. Serial No. 461,518.

To all whom it may concern:

Be it known that I, JOHN GEORIGI, of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Attachments for Phonographs; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The primary object of this invention is to provide a simple device for increasing the volume of sound waves in reproducers of talking machines. Ordinarily the sound waves are collected only from above the diaphragm from which the stylus is suspended, sound from beneath the diaphragm being lost. By means of my invention the ordinary diaphragm and the sound wave collector are inclosed in a casing having a chamber for collecting the sound waves from beneath the diaphragm and transferring them independently of the sound waves of the upper collector to a common point where the conjoint sound waves of greatly increased volume may be transmitted through a tube or horn.

A further object of my invention is to provide a device of this character which may be applied to reproducers now in general use.

The invention will be hereinafter fully set forth and particularly pointed out in the claims.

In the accompanying drawings, Figure 1 is a vertical longitudinal sectional view. Fig. 2 is a plan view with the top and the ordinary reproducer removed. Fig. 3 is a detail. Fig. 4 shows a slight modification. Fig. 5 is a plan view of the form shown in Fig. 4 with top removed. Fig. 6 is an inverted fragmentary view of the top shown in Fig. 4.

Referring to the drawings, 1 designates the diaphragm of an ordinary reproducer of the type employed in connection with the well-known Edison phonograph. This diaphragm is covered by a sound wave collector 2 having a ring 3 which encircles and extends beneath the diaphragm, and also having a tube-like extension 4 to which a flexible tube or a horn may be secured. By this device all the sound waves from above the diaphragm are collected. Ordinarily

the stylus arm is located immediately beneath the diaphragm and at one end is connected to the latter at the center thereof.

According to my invention the reproducer as a whole is located wholly within a casing having a lower chamber 6 beneath the diaphragm and an upper chamber 7, the two chambers being in communication with each other but not with the interior of the sound collector 2. This casing is shown in Fig. 1 as being composed of a lower cup-like portion having a circumferential ring 8 of greater diameter than the ordinary reproducer, and an upper top-piece 9 terminating in a tubular extension 10 which incloses the tubular extension of the ordinary reproducer. The latter is shown as fitted in a ring 12 having a series of peripheral lugs 13 which fit in seats in ring 8. It is held to reproducer 2 by screws 14. The spaces thus formed between ring 12 and ring 8 of the casing form passage-ways for the sound waves from beneath the diaphragm to the top-piece of the casing. In this way the full volume of sound waves produced by the vibratory action of the diaphragm is collected, the sound waves from beneath the diaphragm being transferred to a point some distance above the diaphragm before intermingling with the sound waves collected through the ordinary collector. The top-piece is shown in Fig. 1 as being detachably held by retainers 15 secured to ring 8.

In the use of my invention the stylus arm 16 is located beneath the inclosing casing and is connected in the usual manner to the center of the diaphragm.

It is manifest that the inclosing casing may be constructed in any preferred manner. For instance, the ring 8 instead of being formed integral with the bottom member of the casing may be formed independently thereof, as shown at 8^a in Fig. 4, and it and the top-piece may be held in place by the screws 17 passed through lugs 13^a. In this form the lugs carrying screws 14 may be smaller and arranged intermediate the lugs 13^a. Other changes may be made without departing from the scope of my invention.

To those skilled in the art the advantages of my improvement will be readily appreciated. It may be applied to ordinary reproducers of the type now in general use, without necessitating any change in the con-

struction thereof other than the employment of a link of greater length for connecting the stylus to the diaphragm.

I claim as my invention:

5 1. The combination with a reproducer having a vibratory diaphragm, and a sound-collector for receiving all the sound-waves from above the diaphragm and discharging the same at a certain point, of a casing in-
15 closing such diaphragm and sound-collector and having a chamber for collecting all the sound-waves from beneath said diaphragm and also having an independent passage-way leading from said chamber to about the
20 point of discharge from the first mentioned sound collector.

2. The combination with a reproducer having a vibratory diaphragm, and a sound-collector for receiving all the sound-waves
25 from above the diaphragm and discharging the same at a certain point, of a casing inclosing such diaphragm and sound-collector and having a lower chambered portion for collecting all the sound-waves from beneath
30 said diaphragm, and a top-piece extending around said sound-collector, said chambered portion being in communication with said top-piece, which latter discharges the sound waves from the lower chamber upward be-
35 yond the point of discharge from the first mentioned collector.

3. The combination with a reproducer having a vibratory diaphragm, and a sound-collector for receiving all the sound-waves
40 from above the diaphragm and concentrating said sound waves at a single point, of a casing inclosing such diaphragm and sound-collector comprising a chambered portion encircling said diaphragm, a top-piece above
45 said sound-collector, said chambered portion and top-piece being in communication out-

side of said diaphragm and sound-collector, and means for uniting said chambered portion and top-piece.

4. The combination with a reproducer 45 having a diaphragm and an imperforate sound-collector, of a ring secured to the exterior of said reproducer, a casing in which said ring is mounted having a chambered portion beneath said diaphragm, and a top- 50 piece surrounding said sound-collector, said chambered portion being in communication with said top-piece on the outside of the reproducer.

5. The combination with a reproducer 55 having a vibratory diaphragm and a sound-collector for receiving all the sound waves from above the diaphragm, said collector having a tubular extension, of a casing inclosing said reproducer and having a cham- 60 ber for collecting all the sound-waves from beneath said diaphragm, and a top-piece having a tubular extension surrounding the tubular extension of the sound-collector, said chamber and top-piece being in communica- 65 tion with each other.

6. The combination with a reproducer having a diaphragm and a sound-collector, of a ring secured to said reproducer and having a series of lugs projecting therefrom. 70 a casing having a ring-like portion of greater diameter than the first mentioned ring, a top-piece surrounding said sound-collector, and means for securing said top-piece.

In testimony whereof, I have signed this 75 specification in the presence of two subscribing witnesses.

JOHN GEORIGI.

Witnesses:

GODFREY S. THEISEN,
PATRICK J. O'BRIEN.

H. WOLKE.

GEARING.

APPLICATION FILED SEPT. 12, 1907.

936,264.

Patented Oct. 5, 1909.

Fig. 1

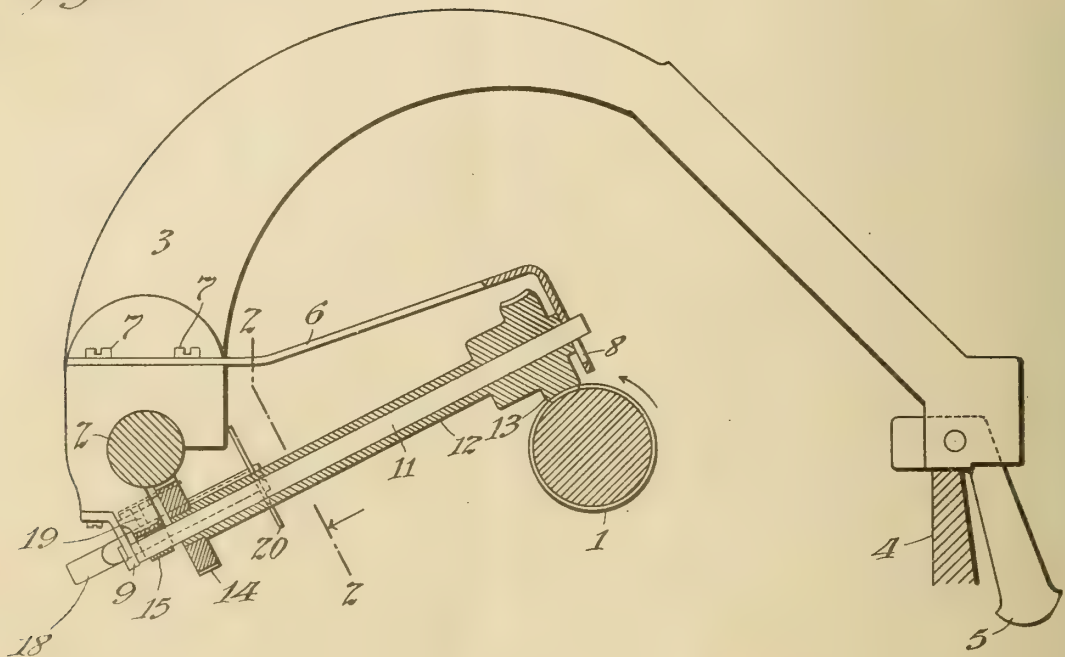


Fig. 2

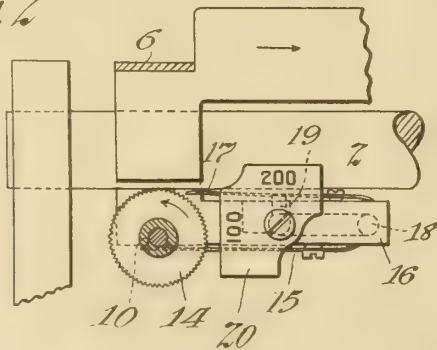
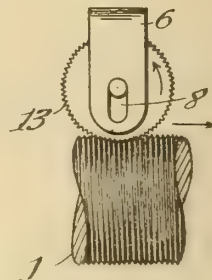


Fig. 3



Witnesses:
Frank D. Lewis
H. H. Dyke

Inventor:
Herman Wolke
by Frank L. Soper *Atty.*

UNITED STATES PATENT OFFICE.

HERMAN WOLKE, OF ORANGE, NEW JERSEY, ASSIGNOR TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

GEARING.

936,264.

Specification of Letters Patent.

Patented Oct. 5, 1909.

Application filed September 12, 1907. Serial No. 392,480.

To all whom it may concern:

Be it known that I, HERMAN WOLKE, a citizen of the United States, and a resident of Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Gearing, of which the following is a description.

My improvement relates to phonographs and particularly to means for advancing the carriage which bears the recorder or reproducer, transversely to the direction of movement of the surface of the record, so that the stylus will traverse a spiral path on the record.

The object of my invention is the production of improved means whereby the carriage may be advanced, either directly by the rotating feed screw, as has hitherto been the practice, or whereby at the will of the operator, the carriage may be advanced at each revolution of the feed screw, a distance bearing any desired ratio to the pitch of the said feed screw. This is desirable in order that a single instrument may be used for the recording or reproduction of records, the record grooves whereof have different pitches. The ordinary phonographs now in use are adapted for the reproduction of the ordinary standard sound record, the grooves whereof have a pitch of substantially one one-hundredth of an inch. As records can now be produced with a very much smaller pitch, preferably one two-hundredths of an inch, and since it is impracticable to manufacture feed screws with so small a pitch, it is an object of my invention to adapt the phonograph for the recording or reproduction of records of either of the sorts above mentioned, by means of a simple adjustment and with as little change as possible from the present form of this instrument.

With this and related objects in mind, my invention consists of the features hereinafter set forth and claimed.

In order that my invention may be more fully understood, reference is hereby made to the accompanying drawings, in which the same reference characters are applied uniformly to the same parts, and wherein

Figure 1 is a cross-sectional view of one form of device constructed in accordance with my invention; Fig. 2 is a cross-sectional view, taken at right angles to Fig. 1 and on the line 2-2 in the said figure and looking in the direction of the arrow, and Fig. 3

is a detail showing the manner in which the worm gear is journaled in the carriage.

In the drawings reference numeral 1 indicates the feed screw of the phonograph, and 2 the back guide rod upon which the carriage 3 is movable. The said carriage, at its forward portion, is slidably supported upon the track 4, and the lever 5 is provided for raising and lowering the carriage. A spring arm 6 is secured to the carriage, as by screws 7. This arm is bent slightly upward just in front of the point where it is secured to the carriage, and its free end is bent downward into a position which is almost vertical. A slot 8 is formed in this downwardly extending portion. A bracket 9 is secured to the lower portion of the carriage and a groove 10 is formed in the carriage immediately adjacent to this bracket. A cylindrical rod 11 is received within the slot 8 and the groove 10 and rests against the bracket 9. Surrounding this rod is a sleeve 12. At that end of the sleeve adjacent to the feed screw is a worm gear 13, and at the opposite end of the sleeve and secured thereto is a toothed wheel 14, the teeth whereof are extremely sharp and hard. A portion of this wheel rests within a cut-away part of the carriage 3, and the hardened teeth on its periphery contact with the guide rod 2, being held thereagainst by means of a spring 15 which is secured upon an arm 16 on the carriage 3. Opposite the spring 15, and with its end bearing against the periphery of the wheel 14, is a much more powerful spring 17. This spring is supported and its end held from contact with the toothed wheel, by means of a crank 18, the shaft whereof is provided with a stud 19. An indicator 20 is attached to the crank shaft, which serves to indicate the number of rotations which the record will make, while the carriage is being advanced through a distance of one inch. When the carriage 3 is raised by means of the lever 5, the rod 11 sliding in the slot 8, the worm wheel 13 does not immediately leave the feed screw but remains in contact therewith, until the rod 11 has reached the lower end of the said slot. The worm wheel is normally maintained in frictional contact with the feed screw by the spring 6, the parts being so adjusted that a portion of the weight of the carriage is supported by this arm.

The operation of the device is as follows:

When the crank 18 is in the position shown in Fig. 2, and the spring 17 is held in its elevated position, the worm gear 13 and the toothed wheel 14 are revolved when the feed screw 1 is actuated and the toothed wheel 14 being held forcibly against the guide rod 2 by the spring 15, the carriage will be advanced at each rotation of the feed screw a distance depending upon the ratio between the diameters of the worm gear and the toothed wheel 14. When these are of substantially the same diameter as in the form illustrated, and a feed screw having a pitch of .01 of an inch is used, the carriage will be advanced at each rotation thereof, a distance equal to one-half of the pitch of the feed screw, or .005 of an inch. If a worm gear or a toothed wheel of a different size were used, the amount of advance would of course be different, depending only upon the ratio between the diameters of these parts. The diameter of the feed screw may vary somewhat without affecting the operation of the device as the worm gear 13 rotates at a speed which depends only upon the pitch and speed of rotation of the feed screw and is independent of its diameter.

In order to adapt the instrument to the reproduction of the ordinary sound record having one hundred threads to the inch, the crank 18 is turned downward through an angle of 90°, bringing the figures 100 on the indicator 20 to the top. This movement of the crank allows the spring 17 to descend upon the toothed wheel 14, holding the same against rotation, and pushing it away from the guide rod 2, since this spring is much stiffer and more powerful than the spring 15 which opposes it. The toothed wheel 14 being thus locked against rotation, the worm gear 13 is likewise held against rotation, and for this reason it acts, on the rotation of the feed screw, precisely like the ordinary feed nut now in common use, and the carriage is advanced at each revolution of the feed screw a distance which is the same as the pitch of the screw.

Having now described my invention, what I claim is

1. In a device of the class described, the combination of a substantially smooth guide rod, a carriage movable thereon and sharp pointed means borne by the carriage and coöperating with the guide rod for moving the carriage on the said rod, and actuating means therefor, substantially as set forth.

2. In a device of the class described, the combination of a substantially smooth guide rod, a carriage movable thereon, a toothed wheel rotatably mounted on the said carriage and coöperating with the guide rod for moving the carriage on the said rod, and means for imparting rotation to said wheel substantially as set forth.

3. In a device of the class described, the

combination of a substantially smooth guide rod, a carriage movable thereon, a hardened toothed wheel rotatable upon said carriage and coöperating with the said guide rod for moving the said carriage on the rod, and actuating means for said wheel, substantially as set forth.

4. In a device of the class described, the combination of a substantially smooth guide rod, a carriage movable thereon, a feed screw, means borne by the carriage and coöperating with the said rod for moving the carriage on the rod, and means under the control of the feed screw for actuating the first named means, substantially as set forth.

5. In a device of the class described, the combination of a substantially smooth guide rod, a carriage movable thereon, a feed screw, a toothed wheel rotatably mounted on the said carriage and coöperating with the said guide rod for moving the said carriage on the rod, and means under the control of the feed screw for rotating said wheel, substantially as set forth.

6. In a device of the class described, the combination of a substantially smooth guide rod, a carriage movable thereon, a feed screw, a wheel having hardened teeth rotatably mounted upon the said carriage and coöperating with the guide rod for moving the carriage, and means under the control of the feed screw for rotating the said wheel, substantially as set forth.

7. In a device of the class described, the combination of a guide rod, a carriage movable thereon, friction means borne by the carriage and spring pressed against the said rod for moving the carriage along the said rod, and actuating means therefor, means for moving said friction means out of contact with said rod, substantially as set forth.

8. In a device of the class described, the combination of a guide rod, a carriage movable thereon, a feed screw, a toothed wheel rotatably mounted on the said carriage, a spring for pressing the wheel against the said rod, and means under the control of the feed screw for rotating the said toothed wheel, substantially as set forth.

9. In a device of the class described, the combination of a guide rod, a carriage movable thereon, a feed screw, a worm gear on said carriage and meshing with the said feed screw, a toothed wheel rotatable on the said carriage, spring pressed against said rod and driven from the said worm gear, substantially as set forth.

10. In a device of the class described, the combination of a stationary member, a movable carriage, a feed screw, a worm wheel on said carriage and meshing with the said feed screw, means actuated from said worm wheel and coöperating with said stationary member for moving the said carriage and releasable means for holding the said worm wheel

against rotation and disengaging the first named means from engagement with the stationary member, substantially as set forth.

11. In a device of the class described, the combination of a substantially smooth guide rod, a carriage movable thereon, a feed screw, a worm wheel movably and rotatably mounted on said carriage and meshing with said feed screw, and means actuated by the worm wheel and cooperating with the guide rod for moving the said carriage, substantially as set forth.

12. In a device of the class described, the combination of a guide rod, a carriage movable thereon, a feed screw, a worm wheel on said carriage, means actuated by the said worm wheel for moving the said carriage, a spring for pressing the said means against a guide rod, and a more powerful, releasable spring acting in opposition to the first named spring and operating when released to prevent the engagement of the said carriage moving means with the said guide rod and to hold the worm gear against rotation, substantially as set forth.

13. In a device of the class described, the combination of a movable carriage, a feed screw, rotatable means on the said carriage for advancing the same at a different rate of advance from that imparted directly by the feed screw, and means for locking the said means against rotation, substantially as set forth.

14. In a device of the class described, the combination of a movable carriage, a member relatively stationary thereto, a feed screw, a worm gear normally rotatable on said carriage and meshing with the said feed screw, means actuated by the said worm gear and cooperating with said relatively stationary member for moving the said carriage, and means for locking the worm gear against rotation, substantially as set forth.

15. In a device of the class described, the combination of a guide rod, a carriage movable thereon, a feed screw, a spring arm on the said carriage, a worm wheel and a toothed wheel journaled between the said carriage and the spring arm, the former meshing with the feed screw and the latter contacting with the guide rod, and a spring for holding the toothed wheel in contact with the guide rod, substantially as set forth.

16. In a device of the class described, the combination of a guide rod, a carriage movable thereon, a feed screw, a spring arm on the said carriage, a worm wheel and a toothed wheel journaled between the said carriage and the spring arm, the former meshing with the feed screw and the latter contacting with the guide rod, a spring for holding the toothed wheel in contact with the guide rod, a more powerful spring in opposition to the first spring, a crank and means under the control of the crank for releasing the

said last named spring to bear against the toothed wheel and hold it away from the guide rod and maintain the worm gear against rotation, substantially as set forth.

17. In a device of the class described, the combination of a guide rod, a carriage movable thereon, a feed screw, a spring arm on said carriage, a shaft, a worm gear and a toothed wheel mounted thereon between the said spring arm and the said carriage, the worm gear meshing with the said feed screw, a spring for holding the toothed wheel against the guide rod and a stronger spring for holding it away therefrom, rotatable means for releasing or supporting the last named spring and an indicator connected to the said rotatable means, substantially as set forth.

18. In a device of the class described, the combination of a movable carriage, a feed screw, a worm wheel rotatably mounted on said carriage in engagement with said feed screw, means actuated by the rotation of said worm wheel for imparting a progressive movement to the carriage and means for locking the said worm wheel against rotation, substantially as set forth.

19. In a device of the class described, the combination of a movable carriage, a rotatable feed screw, a spring secured to the said carriage, a worm wheel engaging said feed screw, and a support for said worm wheel the end of which engages a slot formed in the free end of said spring, substantially as set forth.

20. In a device of the class described, the combination of the feed screw, traveling carriage, rotating worm wheel, and means for locking the same against rotation, and an indicator movable with said locking means for designating the rate of feed of said carriage, substantially as set forth.

21. In a device of the class described, the combination of a movable carriage, a feed screw, rotatable means on said carriage in engagement with said feed screw, means actuated by the rotation of the rotatable means for imparting a progressive movement to the carriage, and means for locking said rotatable means against rotation, and an indicator movable with said locking means for designating the rate of feed of the carriage, substantially as set forth.

22. In a device of the class described, the combination with the feed screw and traveling carriage, of a worm wheel rotatably mounted on said carriage, a stationary member, means rotated by said worm wheel and cooperating with said stationary member, and means for severing the operative connection between the stationary member and worm wheel, substantially as set forth.

23. In a device of the class described, the combination with the feed screw and traveling carriage, of a worm wheel rotatably

mounted on said carriage in engagement with said feed screw, and means operating through said worm wheel for feeding said carriage at a plurality of different speeds, substantially as set forth.

24. In a device of the class described, the combination with a movable carriage and a feed screw, of a worm wheel on said carriage and meshing with the said feed screw, a fixed abutment with which the worm wheel coöperates to advance the carriage by a differential movement, and a single means for

locking the worm wheel against rotation and for simultaneously destroying the coöperative relation between the worm wheel and the abutment to permit the worm wheel to be fed as a nut by the feed screw, substantially as set forth. 15

This specification signed and witnessed this 11th day of September 1907.

HERMAN WOLKE.

Witnesses:

H. H. DYKE,
CHARLES F. ROBSON.



J. F. OTT.
PHONOGRAPHE.

APPLICATION FILED JAN. 20, 1908.

936,265.

Patented Oct. 5, 1909.

Fig. 1

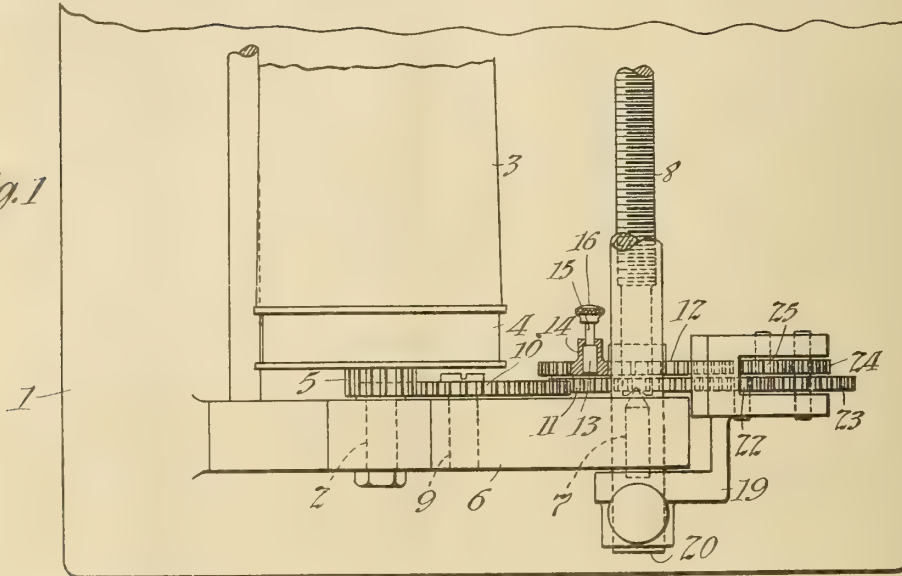
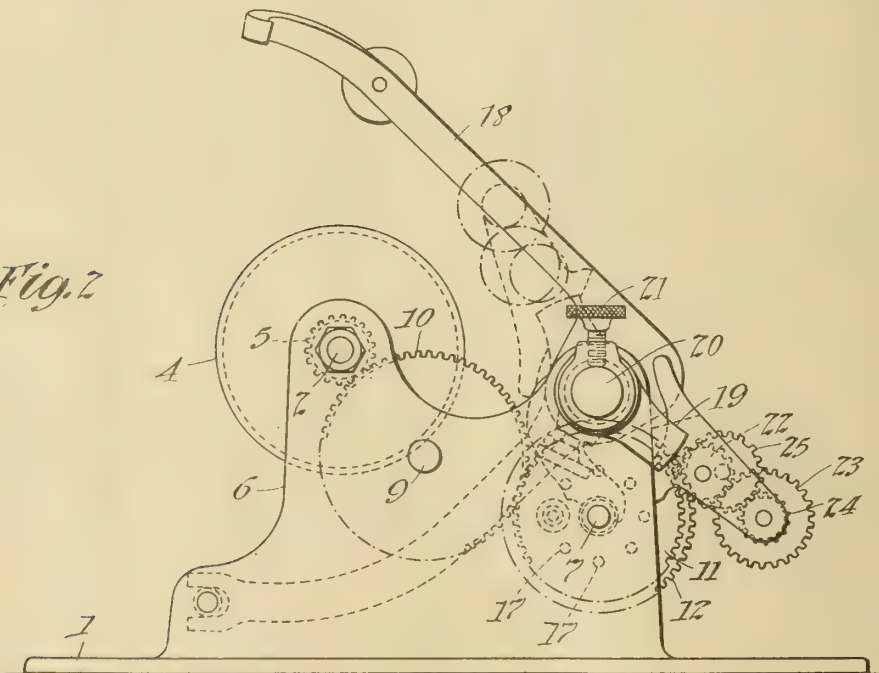


Fig. 2



Witnesses:

Frank A. Lewis
Delos Holden

Inventor:

John F. Ott
by Frank L. Brown

Atty.

UNITED STATES PATENT OFFICE.

JOHN F. OTT, OF ORANGE, NEW JERSEY, ASSIGNOR TO NEW JERSEY PATENT COMPANY,
OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

PHONOGRAPH.

936,265.

Specification of Letters Patent.

Patented Oct. 5, 1909.

Application filed January 20, 1908. Serial No. 411,833.

To all whom it may concern:

Be it known that I, JOHN F. OTT, a citizen of the United States, and a resident of Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Phonographs, of which the following is a description.

My invention relates to phonographs of the type wherein the sound box is carried on a traveling carriage to which a progressive movement is imparted by means of a rotating feed screw, so that the reproducer or recorder stylus traces a spiral path with respect to the record surface. It has been the usual practice for many years to provide a feed screw of fine pitch which advances the traveling carriage a distance of one one-hundredth of an inch for each revolution of the mandrel. More recently, however, it has been found possible to manufacture a sound record in which the record groove has two hundred turns or threads to the inch, so that it is desirable to provide a phonograph in which the feed of the carriage will be suitable for operating upon a record of this description. In view of the fact, however, that there are already thousands of phonographs in use in which the feed screw advances the carriage one one-hundredth of an inch per mandrel revolution, and a vast number of records are also in use having a pitch of one one-hundredth of an inch, it is desirable to provide means which may be readily applied to such phonographs whereby the feed screw may be driven at one-half the speed at which it has heretofore been driven, such means also permitting the driving of the feed screw at its usual speed, so that the phonograph can be used interchangeably with sound records having either one hundred or two hundred threads per inch, and my invention has for its object the provision of interchangeable means of this character which may be readily applied to a phonograph and in which, when so applied, the parts may be readily shifted with respect to each other, so as to drive the feed screw at the desired rate of speed.

Reference is hereby made to the accompanying drawing, of which—

Figure 1 is a plan view, partly in section, showing a portion of a phonograph constructed in accordance with my invention, and Fig. 2 is an end elevation of the same.

In both views corresponding parts are designated by the same reference numerals.

The phonograph shown is of a well-known form and comprises a base 1, to which is secured a fixed horizontal pin or journal 2, upon which the mandrel 3 is rotatably supported, the same being adapted to be driven by the pulley 4 secured to one end of the mandrel and which receives the driving belt from the phonograph motor. A spur gear 5 is rigidly secured to the pulley 4 and rotates therewith. The pin 2 is secured to the upright 6 which is integral with the base 1 and said upright also carries the pivot pin 7 which engages one end of the feed screw shaft 8, and thereby rotatably supports the same in conjunction with a similar pin placed at the other end of the shaft (not shown).

A pin 9 is carried by the upright 6 and rotatably supports a spur gear 10 which meshes with the gear 5. The gear 10 also meshes with a gear 11 loosely mounted on the shaft 8. There is another gear 12 which is fixed upon the said shaft and which is adapted to be locked to the gear 11 by means of a pin 13 which occupies a hollow boss 14 which may be integral with the gear 12. This pin is formed with a shoulder which prevents the same from being removed from the said boss and with a reduced portion 15 on the end of which is a small head 16, by which the pin may be operated. In the position shown in Fig. 1, the gears 11 and 12 are disconnected. The gear 11 is provided with a number of holes 17 arranged concentrically, said holes being at the same distance from the center of the shaft 8 as the pin 13, and being of a size suitable to receive the end of the pin, so that when the pin is moved longitudinally its end will enter one of the said holes and will lock the gears 11 and 12 together. When thus arranged the shaft 8 will be driven from the pulley 4 through the gears 5, 10, 11 and 12, and the same are so proportioned as to drive the shaft 8 at a speed suitable for traversing the sound box carriage 18 when operating upon a record having two hundred threads to the inch.

In order that the shaft 8 may be driven at twice the speed, or a speed suitable for operating on the ordinary record of one hundred threads per inch, I provide a frame

or support 19 which is mounted upon the end of the cross rod 20 which projects beyond the upright 6, said frame being angularly adjustable upon said rod and adapted to be clamped in fixed position by means of a set screw 21. This frame carries a gear train composed of spur gears 22, 23, 24 and 25, the gears 23 and 24 being rigidly mounted on one stud in the frame 19, gears 22 and 25 being mounted on parallel studs, gear 22 meshing with gear 23, and gear 24 meshing with gear 25. It is obvious that the gears can be mounted in any convenient manner so that gears 23 and 24 rotate together, and gears 22 and 25 rotate independently of each other. When the frame 19 occupies the position shown in the drawing the gear 22 meshes with the gear 11, and the gear 25 meshes with the gear 12. In this position, in which, of course, the pin 13 is withdrawn from the hole 17, the pulley 4 drives the screw shaft 8 through the gears 5, 10, 11, 22, 23, 24, 25 and 12, and the gears are so proportioned that the shaft 8 will be driven at the proper speed for traversing the sound box carriage when operating upon a record having one hundred threads to the inch. Obviously all that is necessary to do, in order to produce the desired arrangement for operating upon a record having two hundred threads to the inch is to loosen the set screw 21 and move the frame 19 through a sufficient angle to release the gears 22 and 25 from the gears 11 and 12, then tighten up the set screw 21 to hold the frame in this position, then move the pin 13 inward until its end enters one of the openings 17 of the gear 11, thereby locking the gears 11 and 12 together.

In the claims, the term spindle is used to denote a small cylindrical chamber which is either a revolving member, as in the case of the feed screw shaft or spindle, or is fixed or non-revolving, as in the case of the stationary support on which the mandrel rotates, or in the case of the guide rod, which supports the traveling carriage.

Having now described my invention, I claim:

1. In a phonograph, the combination with the mandrel and feed screw spindle, constituting a pair of revolving members, and a supporting frame at one end of said members, of a spindle supported by said frame, a support pivotally mounted on said last named spindle, gear means carried by said support, and an incomplete gear train connecting said mandrel and feed screw spindle, said support being movable to insert the gear means carried thereby into the gear train to complete the same, substantially as described.

2. In a phonograph, the combination with the mandrel and feed screw spindle, constituting a pair of revolving members, and a

supporting frame at one end of said members, of a cross rod supported by said frame, a support pivotally mounted on a prolongation of said cross rod beyond the frame, gear means carried by said support, and an incomplete gear train connecting said mandrel and said feed screw spindle, said support being movable to insert the gear means carried thereby into the gear train to complete the same, substantially as described.

3. In a phonograph, the combination with the mandrel and feed screw spindle, constituting a pair of revolving members, and a supporting frame at one end of said members, of a rod supported by said frame, a support pivotally mounted on said rod, gear means carried by said support, fast and loose gears co-axial with one of said members, gear means connecting said other member with said loose gear, said gear means carried by said support being movable by the pivotal movement of the support to connect and disconnect said fast and loose gears, substantially as described.

4. In a phonograph, the combination with the mandrel and feed screw spindle, constituting a pair of revolving members, and a supporting frame at one end of said members, of a rod supported by said frame, a support pivotally mounted on said rod, gear means carried by said support, fast and loose gears co-axial with one of said members, gear means connecting said other member with said loose gear, said gear means carried by said support being movable by the pivotal movement of the support to connect and disconnect said fast and loose gears, and means for locking together said fast and loose gears, substantially as described.

5. In a phonograph, the combination with the mandrel and feed screw spindle, constituting a pair of revolving members, and a supporting frame at one end of said members, of a spindle carried by said frame, a support movably mounted on said last named spindle, gear means carried by said support, fast and loose gears co-axial with one of said members, gear means connecting said other member with said loose gear, said gear means carried by said support being movable therewith to connect and disconnect said fast and loose gears, substantially as described.

6. In a phonograph, the combination with the mandrel and feed screw spindle, constituting a pair of revolving members, and a supporting frame at one end of said members, of gears carried by the said members, means for connecting them to drive the feed spindle from the mandrel at a definite ratio, including gear means in mesh with the mandrel gear, a stud carried by said frame, and a pivoted support sleeved thereon carrying a gear train adapted to be brought into

mesh with the feed screw gear and the gear means in mesh with the mandrel gear to drive the feed spindle from the mandrel at a different ratio, substantially as described.

- 5 7. In a phonograph, the combination with a plurality of parallel transverse spindles, a mandrel carried by one of said spindles, and one of said spindles having a feed screw cut thereon, of a support pivotally mounted
10 on one of said spindles, gear means carried by said support, and an incomplete gear

train connecting said mandrel and feed screw, said support being movable to insert the gear means carried thereby into the said gear train to complete the same, substantially as described. 15

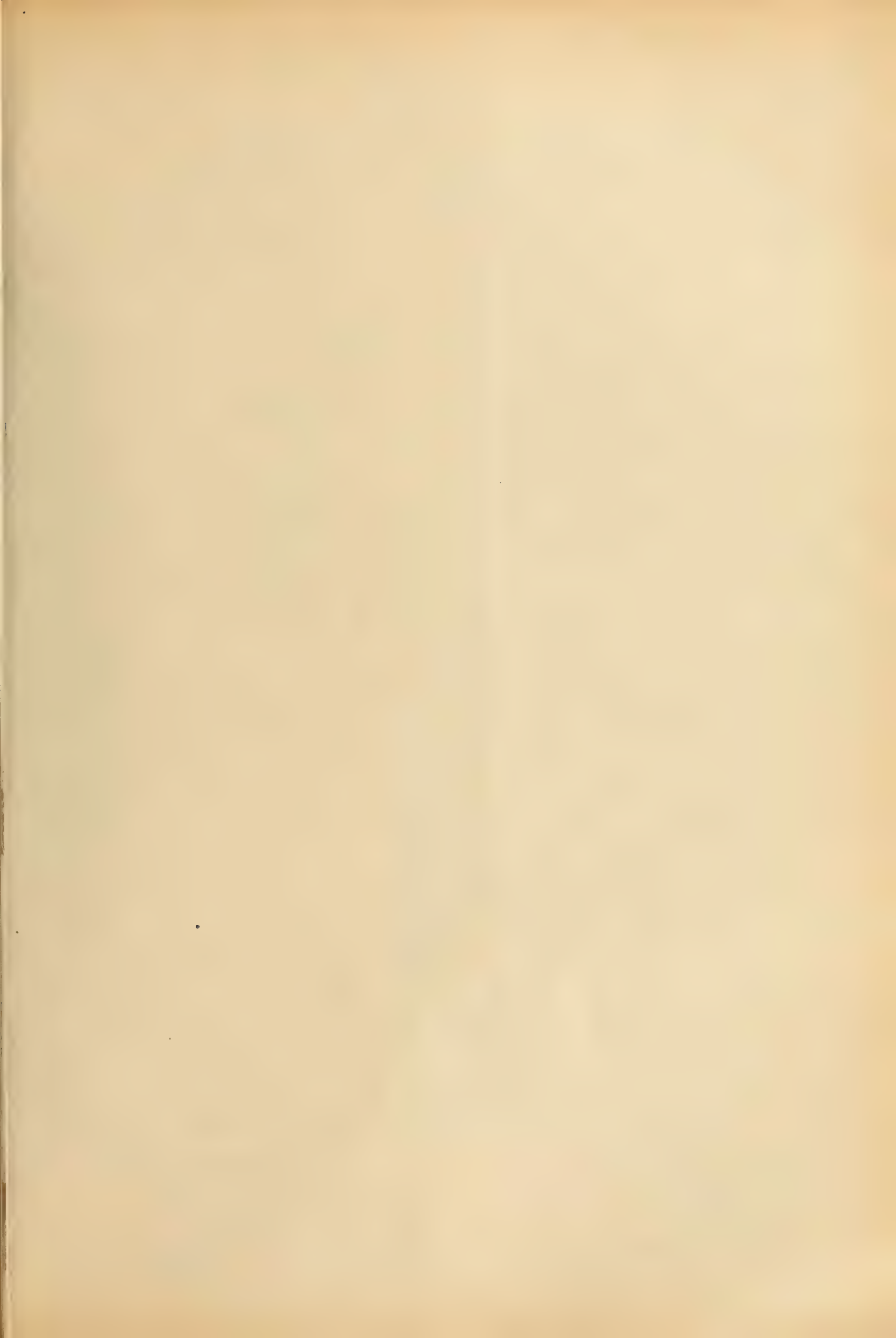
This specification signed and witnessed this 13 day of Jany., 1908.

JOHN F. OTT.

Witnesses:

H. H. DYKE,

FRANK W. LEWIS.



APPLICATION FILED FEB. 6, 1908.

Patented Oct. 5, 1909.

Fig. 4

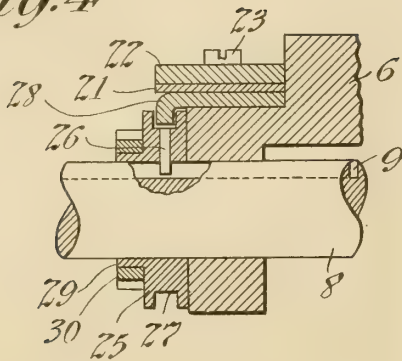


Fig. 5

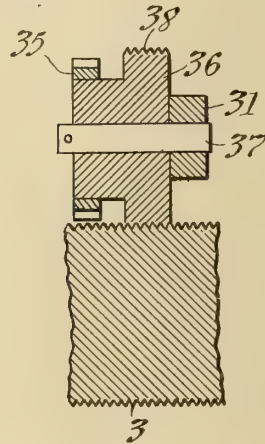
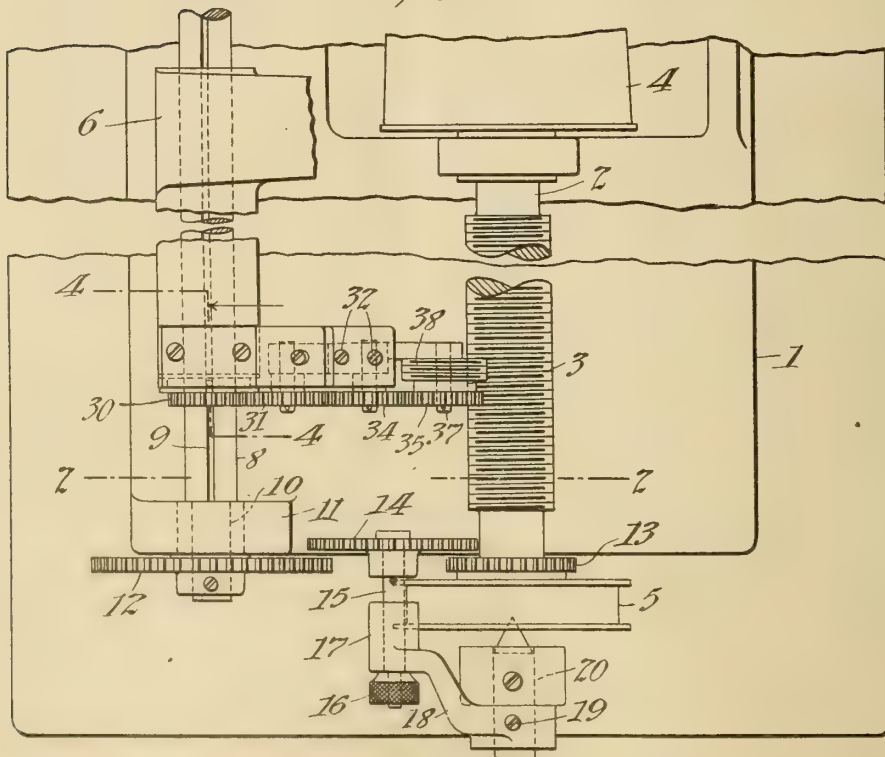
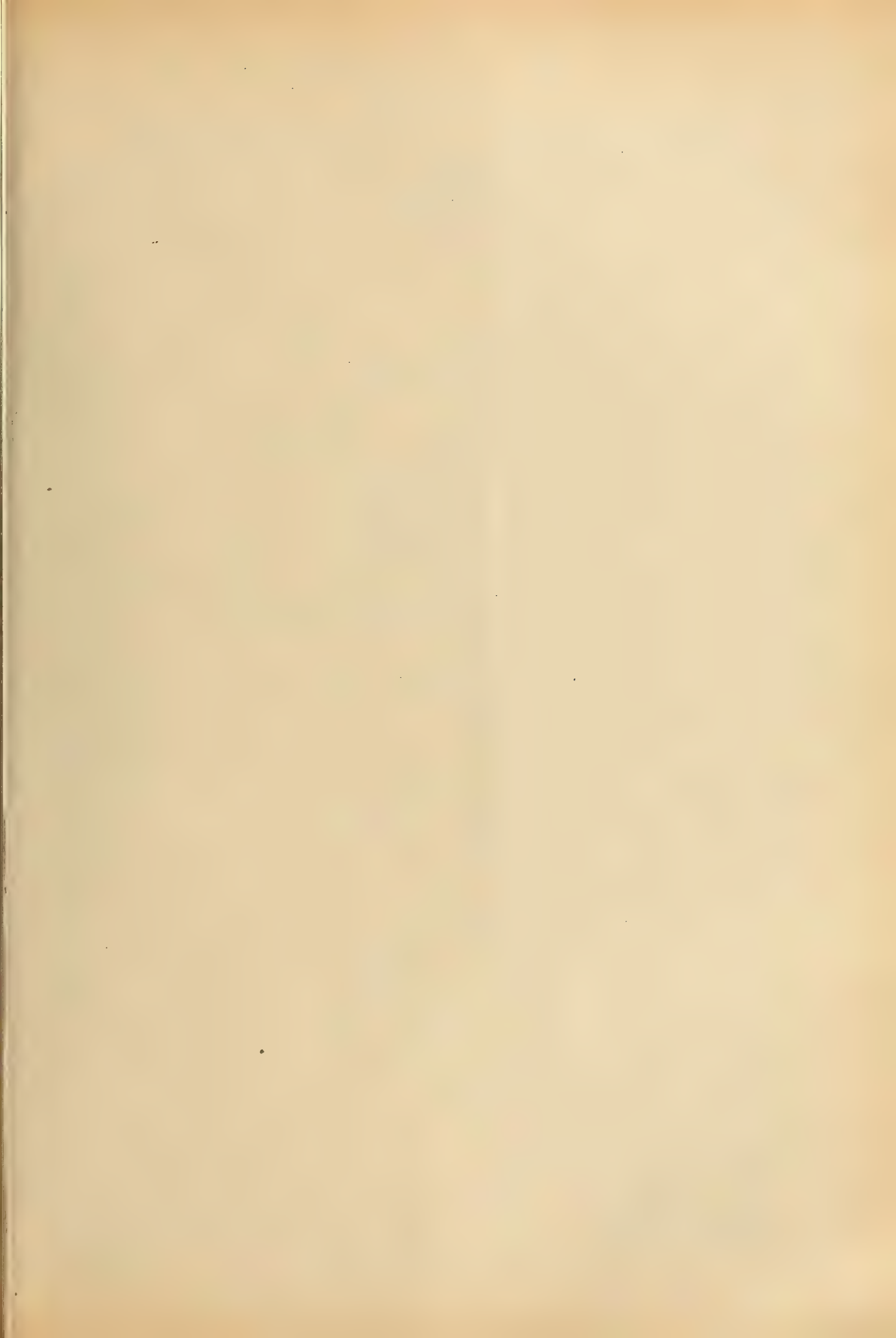


Fig. 1



Frank Lewis
Herbert A Dyke

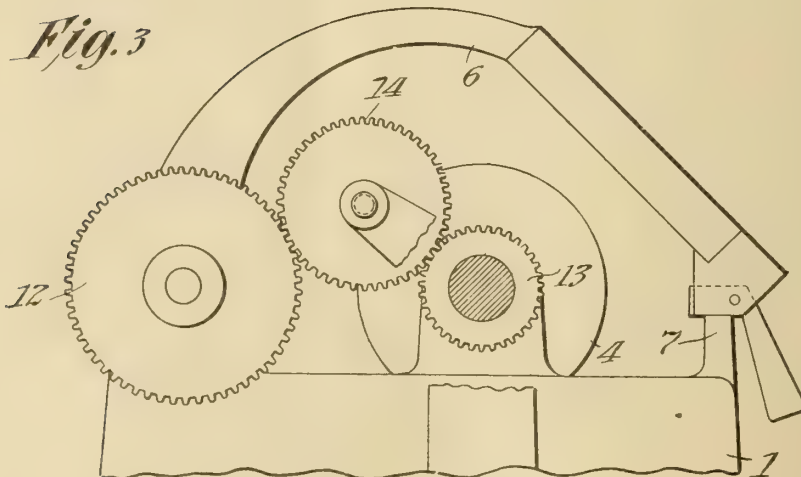
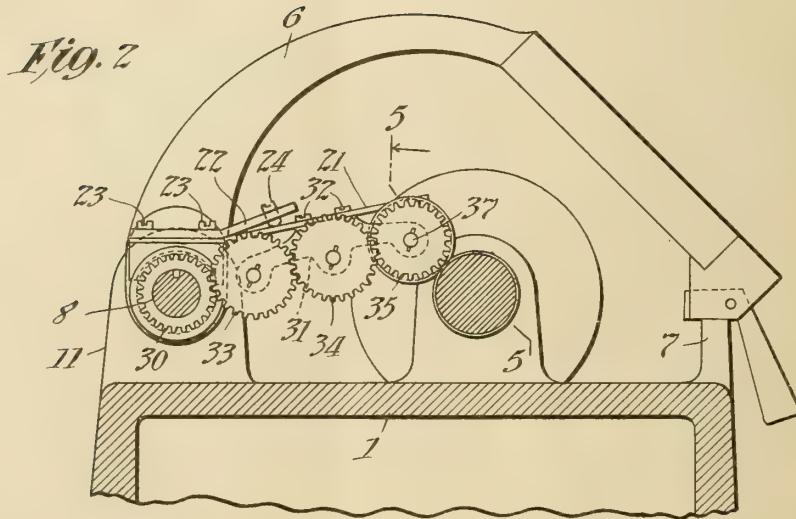
Peter Weber
by Frank L. Weber
Atty.



P. WEBER.
 PHONOGRAPH.
 APPLICATION FILED FEB. 6, 1908.

936,266.

Patented Oct. 5, 1909.
 2 SHEETS—SHEET 2.



Witnesses:
 Frank D. Lewis,
 Herbert H. Dyke

Inventor:
 Peter Weber
 by Frank L. Ryan
 Atty.

UNITED STATES PATENT OFFICE.

PETER WEBER, OF ORANGE, NEW JERSEY, ASSIGNOR TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

PHONOGRAPH.

936,266.

Specification of Letters Patent.

Patented Oct. 5, 1909.

Application filed February 6, 1908. Serial No. 414,595.

To all whom it may concern:

Be it known that I, PETER WEBER, a citizen of the United States, and a resident of Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Phonographs, of which the following is a description.

My invention relates to phonographs of the type wherein the sound box is carried on a traveling carriage to which a progressive movement is imparted by means of a rotating feed screw, so that the reproducer or recorder stylus traces a spiral path with respect to the record surface.

It has been the usual practice for many years to provide a feed screw of fine pitch which will advance the traveling carriage a distance of one one-hundredth of an inch for each revolution of the mandrel. More recently, however, it has been found possible to manufacture a sound record in which the record groove has two hundred turns or threads to the inch, so that it is desirable to provide a phonograph in which the feed of the carriage will be suitable for operating upon a record of this description. In view of the fact, however, that there are already thousands of phonographs in use in which the feed screw advances the carriage one one-hundredth of an inch per mandrel revolution, and a vast number of records are also in use having a pitch of one one-hundredth of an inch, it is desirable to provide means which may readily be applied to such phonographs whereby the carriage may be driven at one-half the speed at which it has been heretofore driven, such means also permitting the feeding of the carriage at its usual speed, so that the phonograph can be used interchangeably with sound records having either one hundred or two hundred threads per inch, and my invention has for its object the provision of interchangeable means of this character which may be readily applied to a phonograph and in which, when so applied, the parts may be readily shifted with respect to each other, so as to drive the carriage at the desired rate of speed.

Reference is hereby made to the accompanying drawings, in which corresponding parts are designated by the same reference numerals in the several views, of which

Figure 1 is a plan of a portion of a phonograph to which my invention is ap-

plied; Fig. 2 is a section on line 2—2, Fig. 1; Fig. 3 is a side elevation of the phonograph, some of the parts being broken away; Fig. 4 is a section on line 4—4 of Fig. 1 and Fig. 5 is a section on line 5—5 of Fig. 2.

The phonograph shown is of well-known form and comprises a base or body 1 which supports the main shaft 2 upon which the feed screw 3 is formed and which carries the mandrel 4, and drive pulley 5 over which passes the belt from the phonograph motor. The traveling sound box carriage 6 rests at its forward end upon the usual straight edge or track 7, and is sleeved at its rear upon a rod 8 which takes the place of the usual fixed guide rod. The rod 8 is provided with a longitudinal groove 9 and is journaled in bearings 10 secured within the uprights 11 which are integral with the base 1. Upon the end of the shaft or guide rod 8 is a spur gear 12 and another spur gear 13 is fixed to the shaft 2. These gears may be brought into driving relation to each other by a slidable gear 14 fixed upon the end of a pin 15 which has a removable head 16 and is movable longitudinally within a bore formed within the boss 17 of the arm 18, the latter being secured by a set screw 19 to the pin or center 20 upon which the shaft 2 rotates. A flat spring 21 and a bent plate 22 are secured at their rear ends to the carriage 6 by screws 23, and a screw 24 is threaded in the plate 22 in such position that its lower end bears against the upper surface of the spring 21, in order to regulate or adjust the tension thereof.

There is a sleeve 25 slidably mounted upon the shaft 8 and held against rotation by a pin 26 which extends into the groove 9. The sleeve 25 is provided with a circumferential groove 27 into which extends the vertical portion of a bent plate 28 which is clamped between the spring 21 and carriage 6 by the screws 23, said plate serving to secure the sleeve 25 to the carriage 6 while permitting rotation thereof with the shaft 8. The sleeve 25 is provided with a flange or hub 29 upon which is fixed a spur gear 30. A frame 31 is secured to the spring 21 by screws 32, and supports a gear train composed of spur gears 33, 34 and 35, the gear 35 being fixed upon the hub of a wheel 36 rotatable upon the pin 37, and the periphery of said wheel is formed with a screw thread 38 having the same pitch as the thread of

the screw 3, but of reverse direction, so that the wheel 36 is adapted to mesh with the screw 3, being held in yielding engagement therewith by the resilience of the spring 21, the degree of pressure being regulated by the screw 24, as previously described.

The operation of the device is as follows: When the parts are in the positions shown in Fig. 1, the rotation of the feed screw 3 will impart a progressive movement to the carriage 6, and will advance the same for each revolution of the feed screw a distance equal to the pitch thereof, the threaded wheel 36 acting merely as a feed nut, since the frictional engagement of the said wheel with respect to the feed screw is not sufficient to overcome the friction of the gears 33, 34 and 35 upon their pintles, and the friction of the shaft 8 in its bearings, said friction therefore acting as a means for holding the wheel 36 against rotation. The rate of feed of the carriage is therefore suitable for operating upon a record having one hundred threads per inch. When the pin 15 is moved outward the gear 14 is brought into engagement with the gears 13 and 12 and the latter is therefore positively driven from the shaft 2 and drives the shaft 8. The shaft 8 drives the gears 30, 33, 34 and 35 and thereby causes the wheel 36 to rotate in a direction opposite to that in which the shaft 2 is rotating and at one-half the speed thereof. On account of this rotation of the wheel 36 the movement imparted to the carriage by the feed screw 3 is at a rate which is exactly one-half what it was in the former case, and the carriage is therefore fed at a rate suitable for operating upon records having two hundred threads per inch.

Having now described my invention what I claim is:

1. In a phonograph, the combination of the rotating mandrel, feed screw and traveling carriage, of a rotary wheel carried by the carriage in engagement with the feed screw, means for holding said wheel against rotation, and interchangeable means for imparting rotation to said wheel independently of its frictional engagement with the feed screw, substantially as set forth.

2. In a phonograph, the combination with the rotating mandrel, feed screw and traveling carriage, of a rotary wheel carried by the carriage in frictional engagement with the feed screw, means for holding the same against rotation, and interchangeable means for positively driving the same while in frictional engagement, at a speed different from that of the feed screw, substantially as set forth.

3. In a phonograph, the combination of the rotating mandrel, feed screw and traveling carriage, of a rotary wheel carried by the carriage and having its periphery formed with a thread adapted to engage the thread

of the feed screw and of opposite direction, means for holding said wheel against rotation, and interchangeable means for positively driving said wheel in a direction opposite to the direction of rotation of said feed screw, substantially as set forth.

4. In a phonograph, the combination of the rotating mandrel, feed screw and traveling carriage, of a rotary wheel carried by the carriage and having its periphery formed with a thread of opposite direction from that of the feed screw and in engagement therewith, the diameter of said wheel being substantially the same as that of the feed screw, and interchangeable means for positively driving said threaded wheel in a direction opposite to that in which the feed screw rotates, substantially as set forth.

5. An attachment for phonographs consisting of a spring 21 carrying a gear train and a rotary threaded wheel adapted to frictionally engage the feed screw, substantially as set forth.

6. An attachment for phonographs consisting of the spring 21 carrying a gear train and a threaded wheel adapted to frictionally engage the feed screw and means for varying the tension of said spring, substantially as set forth.

7. In a phonograph, the combination of the rotating mandrel, feed screw and traveling carriage, of a rotary shaft 8 upon which the carriage is sleeved, means for driving said shaft, a rotary wheel carried by the carriage in frictional engagement with the feed screw and a driving connection between said shaft 8 and said wheel, substantially as set forth.

8. In a phonograph, the combination of the rotating shaft 8, traveling carriage slidable thereon, a gear 35 traveling with said carriage, and a driving connection between said shaft and gear, substantially as set forth.

9. In a phonograph, the combination of the rotating shaft 8, traveling carriage slidable thereon, said shaft having a groove formed therein, and a gear 35 traveling with said carriage and having a spline engaging said groove, substantially as set forth.

10. In a phonograph, the combination of the rotating shaft 8, traveling carriage slidable thereon, and a sleeve 25 in driving connection with said shaft, said sleeve being formed with a circumferential groove 27 and said carriage being provided with a member 28 in engagement with said groove, substantially as set forth.

11. In a phonograph, the combination of the traveling carriage, the threaded wheel 36 carried thereby, the gear 35 rigid with said wheel, and means for driving said gear, substantially as set forth.

12. In a phonograph, the combination with the rotating mandrel, feed screw shaft

and traveling carriage, of a rotary shaft 8 upon which the carriage is sleeved, a gear 12 mounted on said shaft, a gear 13 mounted on the feed screw shaft, and a sliding gear 14 adapted to be brought into driving relation with said gears 12 and 13, substantially as set forth.

13. In a phonograph, the combination of a rotatable feed screw, a carriage mounted to travel parallel to the feed screw, a rotary wheel carried by the carriage in meshing engagement with the feed screw, means for holding said wheel against rotation, and means for imparting rotation to said wheel independently of its frictional engagement with the feed screw, substantially as set forth.

14. In a phonograph, the combination of a rotatable feed screw, a shaft parallel thereto, a carriage mounted to travel on said shaft, a rotary wheel carried by the carriage

in meshing engagement with the feed screw, gear connections movable with said carriage between said wheel and said shaft, and means for rotating said wheel or not, as desired, substantially as set forth.

15. In a phonograph, the combination of a pair of shafts, centers on which one of said shafts is mounted, gears on said shafts, a bracket carried by one of said centers, a stud carried in slidable relation by said bracket and a gear carried by said stud, movable into and out of mesh with said other gears by the sliding movement of said stud, substantially as set forth.

This specification signed and witnessed this 4th day of Feby. 1908.

PETER WEBER.

Witnesses:

FRANK D. LEWIS,
H. H. DYKE.



T. A. EDISON.
FEED MECHANISM FOR PHONOGRAPHS AND OTHER MACHINES.
APPLICATION FILED JAN. 17, 1907.

936,267.

Patented Oct. 5, 1909.

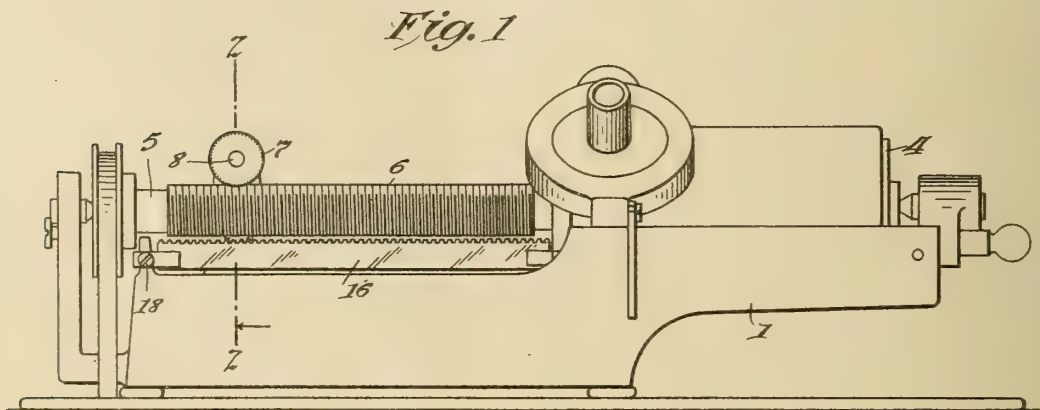


Fig. 3

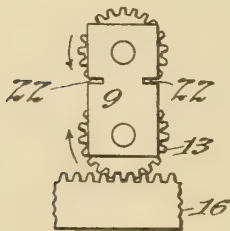


Fig. 4

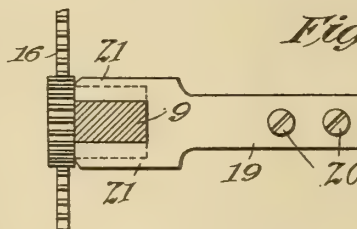


Fig. 2

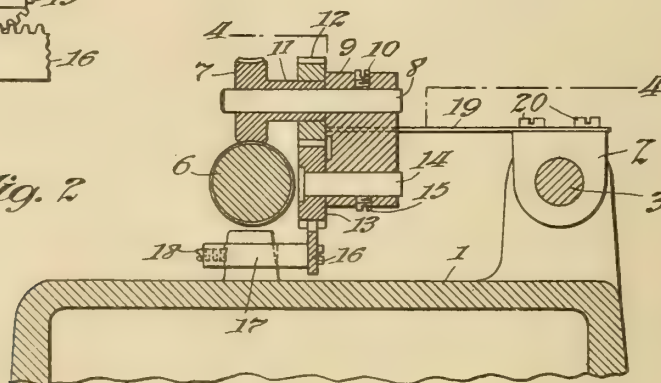
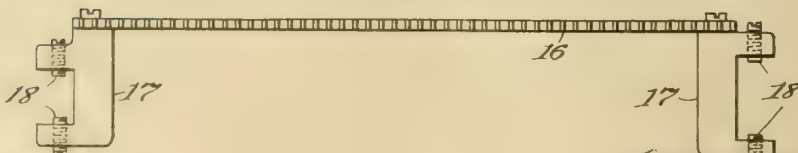


Fig. 5



Witnesses:

Frank D. Lewis
Delos Holden

Inventor:

Thomas A. Edison
By Frank L. Ryan
Atty.

UNITED STATES PATENT OFFICE.

THOMAS A. EDISON, OF ORANGE, NEW JERSEY, ASSIGNOR TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

FEED MECHANISM FOR PHONOGRAPHS AND OTHER MACHINES.

936,267.

Specification of Letters Patent.

Patented Oct. 5, 1909.

Application filed January 17, 1907. Serial No. 352,720.

To all whom it may concern:

Be it known that I, THOMAS ALVA EDISON, a citizen of the United States, residing at Llewellyn Park, Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Feed Mechanism for Phonographs and other Machines, of which the following is a description.

My invention relates to mechanical movements and more particularly to means for imparting a progressive movement to the carriage which carries the reproducer or recorder of a phonograph, whereby the same is fed transversely with respect to the direction of movement of the surface of the record and the stylus traces upon the same a spiral path. In devices of this character it has been the usual practice heretofore to provide a feed screw cut with a very fine thread, such as one hundred threads to the inch, and to secure to the carriage a spring arm provided with a nut for engagement with said screw thereby feeding the carriage forward a distance of one one-hundredth of an inch for each revolution of the feed screw. It has sometimes seemed advantageous to feed the carriage at a slower rate of speed than this, but for mechanical reasons the use of a screw of finer pitch is not desirable.

According to the present invention a very low rate of travel may be obtained for the carriage, such for example, as would be produced by a feed screw having two hundred threads to the inch and operating in the usual way; and in fact, if desired, this rate of feed may be obtained from a feed screw having less than one hundred threads to the inch. This result is accomplished by substituting for the feed nut referred to a worm gear carried by the carriage in engagement with the feed screw, being pivoted on an axis perpendicular thereto, and providing means which rotates with the worm gear, as, for example, a pinion, and fixed means which coöperates with said rotating means for imparting progressive movement to the carriage, for example, a rack fixed to the body of the instrument with which the pinion meshes. By varying the relative sizes of the worm gear and pinion, any desired rate of feed of the carriage may be obtained. When the pitch diameter of these two gears is the same, and a feed screw of

one hundred threads to the inch is used, the rate of feed of the carriage will be one two-hundredths of an inch for each revolution of the feed screw.

With these ends in view my invention consists of the features hereinafter set forth and claimed.

Referring to the accompanying drawings, Figure 1 is a front elevation of a phonograph provided with a feed device constructed in accordance with my invention; Fig. 2, is a section on line 2—2 of Fig. 1; Fig. 3, is a detail front view of the spur gears which are carried by the traveling carriage and the fixed rack which coöperates therewith; Fig. 4 is a section on line 4—4 of Fig. 2, and Fig. 5 is a plan view of the rack and supporting clamps for securing the same to the phonograph body.

Corresponding parts are designated by the same reference numerals in the several views.

The phonograph shown is of the Edison type and comprises the usual body 1 and carriage 2 which slides upon the back rod 3. The mandrel 4 is mounted upon the main shaft 5 which is provided with a feed screw 6 which, as has been explained, is ordinarily made of a pitch of one one-hundredth of an inch, although a screw of different pitch may be used, as has been indicated. In engagement with the thread of the screw 6 so as to be rotated thereby, is a worm gear 7 journaled on a pin or stud 8 which is perpendicular to the axis of the shaft 5 and is held in a socket in the block 9 by a set screw 10. The worm gear 7 is formed with an integral sleeve 11 to which is secured a spur gear or pinion 12. Meshing with the gear 12 is a second pinion 13 which is journaled on a pin 14 held in a socket in the block 9 by a set screw 15. The pinion 13 meshes with the teeth of a rack 16 which is secured to the body of the phonograph in any suitable manner, as, for example, by being secured at each end to plates 17, 17 provided with clamping screws 18, which are adapted to clamp upon certain projections with which phonographs of the type shown are provided.

The block 9 is supported by a flat spring arm 19 which is secured at its rear end by screws 20 to a portion of the traveling carriage 2. The free end of the spring 19 is forked and the prongs 21 are removably

fitted into the horizontal grooves 22 formed in the lateral faces of the block 9, whereby the said block with the gears carried thereby may be readily detached from the traveling carriage of the phonograph, thus allowing the substitution of a block provided with an ordinary feed nut for engagement with the screw 6 for feeding the carriage 2 in the usual manner.

10 It is obvious that the gear 13 is merely an idler for causing the carriage to be fed in the proper direction with the screw shown. By using a screw which is oppositely threaded, this idler can of course be dispensed with.

15 While I have described my invention as applied to a phonograph for producing the desired feed of the traveling carriage, it is obviously not limited to such use, and may be applied to any mechanism whatever for converting rotary movement into progressive lineal movement.

Having now described my invention, what I claim as new and desire to secure by Letters Patent, is as follows:

1. A device of the class described comprising a feed screw and movable carriage in combination with a spring supported worm gear carried by the carriage in engagement with said feed screw, means rotating with the worm gear, and fixed means cooperating with said rotating means for imparting progressive movement to said carriage, substantially as set forth.

35 2. A device of the class described comprising a feed screw and movable carriage in combination with a flat spring secured at one end to said carriage, a worm gear supported by the free end of said spring and engaging said feed screw, means rotating with the worm gear, and fixed means cooperating with said rotating means for imparting progressive movement to said carriage, substantially as set forth.

45 3. A device of the class described comprising a feed screw, a rack, a movable carriage, a member removably secured to the said carriage, a worm wheel rotatable on said member, a pinion driven from the worm wheel and adapted to engage the said rack, substantially as set forth.

4. In a device of the class described, the combination of a feed screw, a stationary

rack, a movable carriage, a flat spring secured at one end to said carriage, a member provided with a recess adapted to receive the free end of said spring, a worm gear engaging the said feed screw and a pinion driven from the said worm gear and cooperating with the said rack to impart movement to the carriage, substantially as set forth.

5. A device of the class described comprising a revoluble feed screw, a stationary rack, a movable carriage, a member attached to said carriage, a member provided with a recess adapted to removably engage said first named member, and a gear train carried by said removable member meshing with said feed screw and said rack to impart movement to the carriage, substantially as set forth.

6. A device of the class described comprising a revoluble feed screw, a stationary rack, a movable carriage, a member attached to said carriage, said member being forked at its free end, a block provided with recesses adapted to be removably engaged by the prongs of the fork to support the block, and gear means carried by said block meshing with said feed screw and said rack to impart movement to the carriage, substantially as set forth.

7. In a device of the class described, a member formed with parallel grooves on its opposite sides adapted to slidably receive stationary holding members to removably support the grooved member, and a gear train carried by said grooved member, substantially as set forth.

8. In a device of the class described, a member formed with parallel grooves on its opposite sides adapted to slidably receive stationary holding members to removably support the grooved member, and a worm gear rotatably mounted on said grooved member, a pinion secured to the worm gear, and a second pinion carried by the said grooved member and meshing with the first pinion, substantially as set forth.

This specification signed and witnessed this 11th day of January 1907.

THOS. A. EDISON.

Witnesses:

FRANK L. DYER,
ANNA R. KLEHM.

H. WOLKE.
PHONOGRAPH.

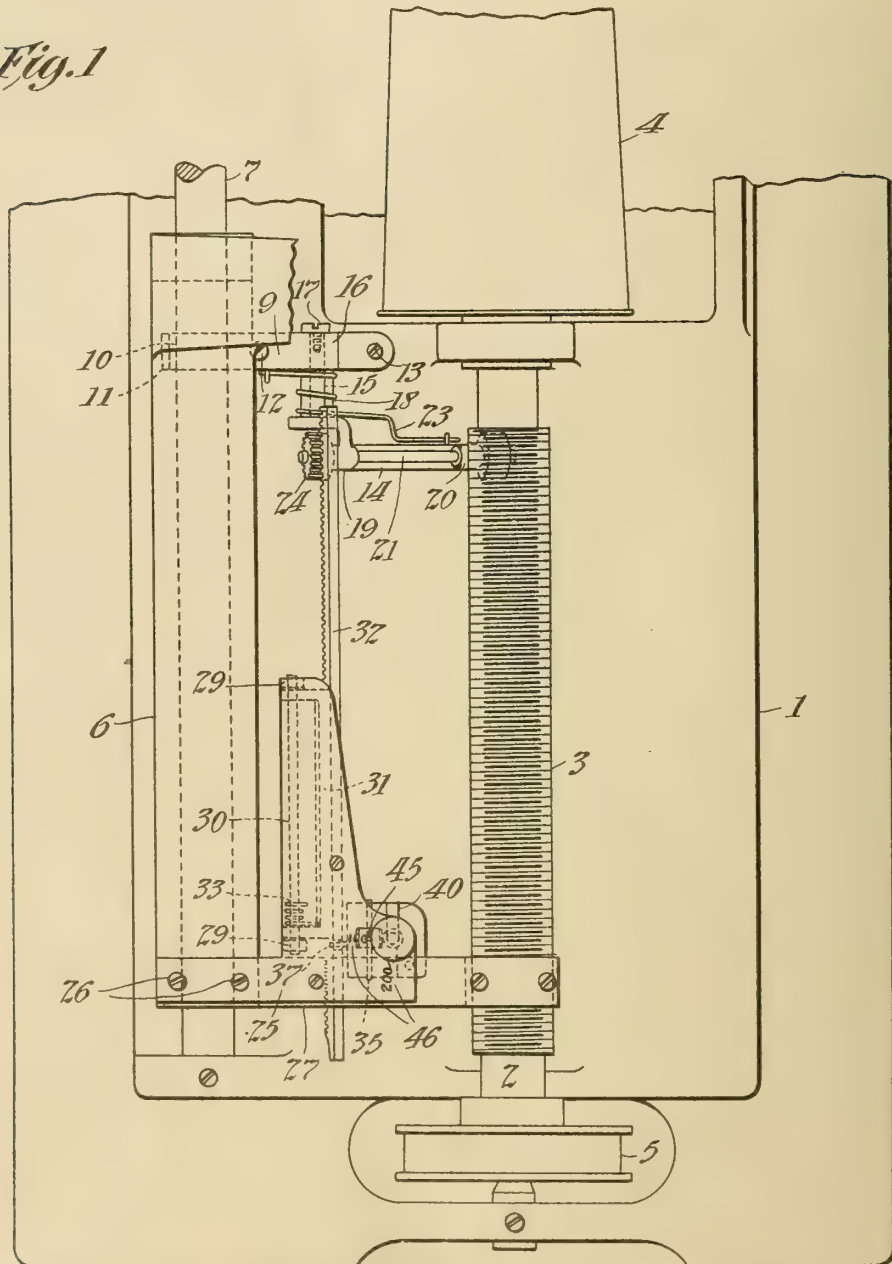
APPLICATION FILED FEB. 6, 1908.

936,268.

Patented Oct. 5, 1909.

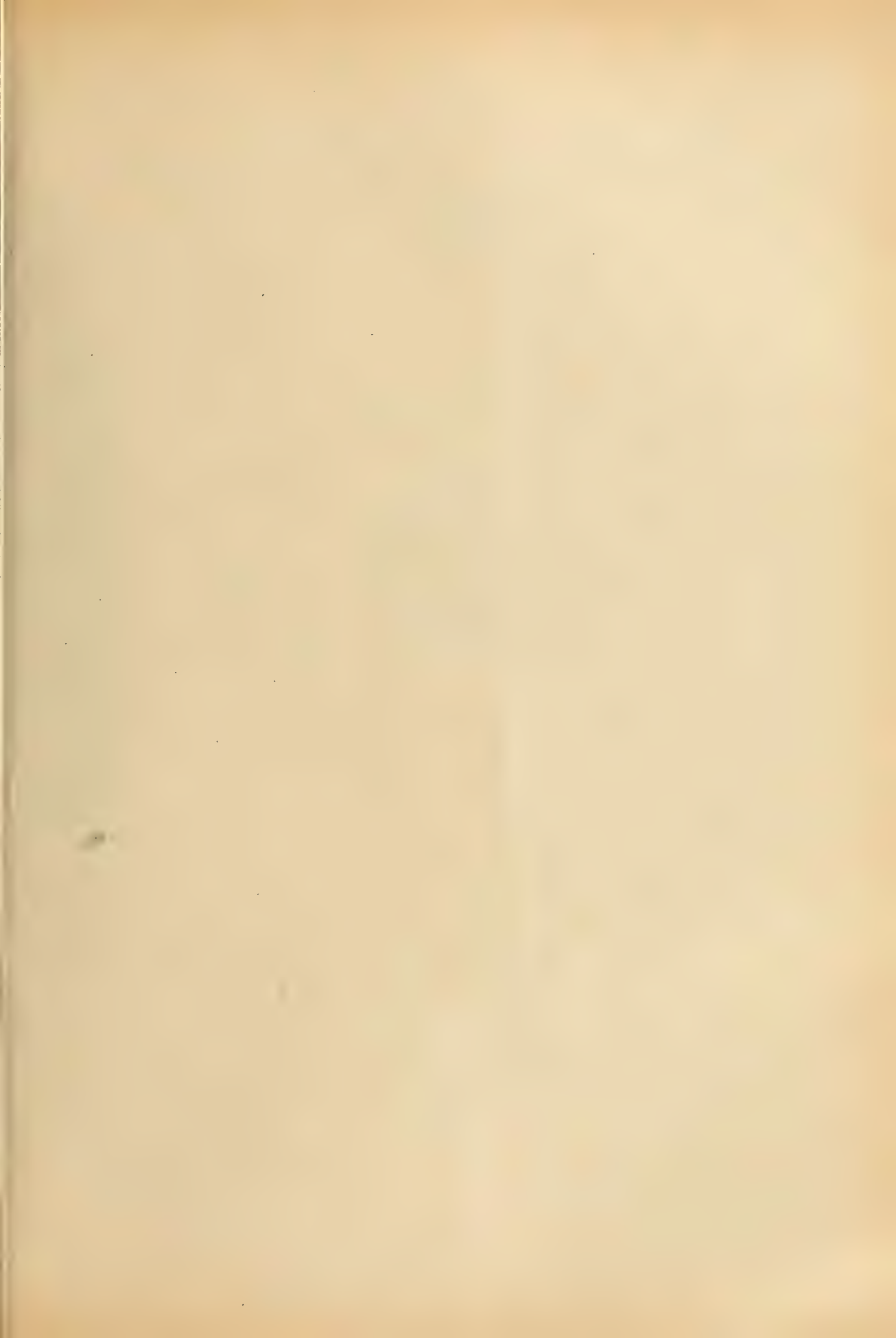
2 SHEETS—SHEET 1.

Fig. 1



Witnesses:
Franc D. Lewis
Robert H. Dyke

Inventor:
Herman Wolke
By Frank L. Green
Atty.



H. WOLKE.
PHONOGRAPH.

APPLICATION FILED FEB. 6, 1908.

936,268.

Patented Oct. 5, 1909.

2 SHEETS—SHEET 2.

Fig. 2

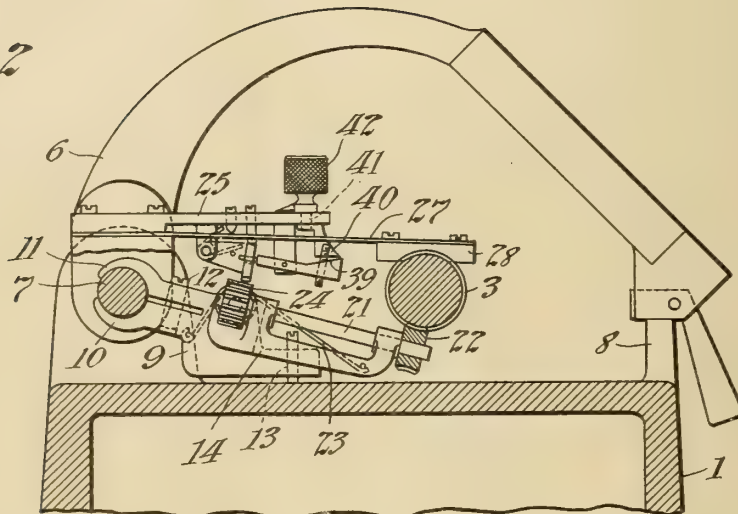
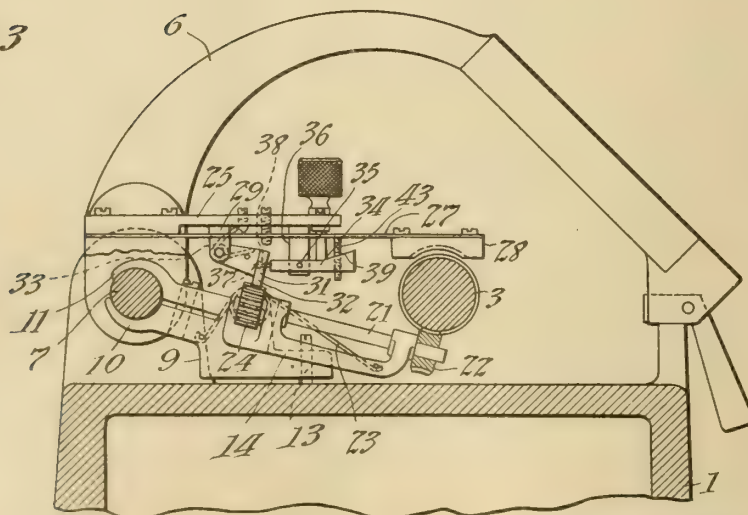


Fig. 3



Witnesses:

Frank D Lewis
Robert H Dyke

Inventor:

Herman Wolke

by Frank L. Dyer

Atty.

UNITED STATES PATENT OFFICE.

HERMAN WOLKE, OF ORANGE, NEW JERSEY, ASSIGNOR TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

PHONOGRAPH.

936,268.

Specification of Letters Patent.

Patented Oct. 5, 1909.

Application filed February 6, 1908. Serial No. 414,592.

To all whom it may concern:

Be it known that I, HERMAN WOLKE, a citizen of the United States, and a resident of Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Phonographs, of which the following is a description.

My invention relates to phonographs of the type in which a progressive movement is imparted to the sound box carriage by means of a rotating feed screw, the carriage moving transversely to the direction of movement of the record surface so that the stylus of the recorder or reproducer will trace a spiral path on the record.

The object of my invention is the production of improved means whereby the carriage may be advanced by the feed screw at each revolution a distance equal to the pitch of the feed screw, as has hitherto been the usual practice, or, whereby, at the will of the user, the carriage may be advanced at each revolution of the feed screw a distance bearing any desired ratio to the pitch of the feed screw. By these means a single instrument may be used for the recording or reproduction of records, the record grooves whereof have different pitches, as for example, the same instrument may be used for records having either one hundred or two hundred threads per inch.

The improvement herein disclosed is capable of being applied to phonographs of well-known construction and has been devised with this particular object in view, and also with the object of simplifying the construction as much as possible and producing a device which will be cheap to manufacture and durable in use.

Reference is hereby made to the accompanying drawing of which—

Figure 1 is a plan view of a portion of a phonograph to which my invention is applied; Fig. 2 is a side view of the same, partly in section, showing the parts in position for feeding the carriage directly from the feed screw at a rate equal to the pitch thereof, and Fig. 3 is a similar view showing the parts arranged for feeding the carriage at a different rate, as when operating upon records having two hundred threads per inch.

In all of the views the same reference numerals are used to designate corresponding parts.

The phonograph shown is of well known form and comprises a base or body 1, which supports the main shaft 2, upon which the feed screw 3 is formed, and which is ordinarily of fine pitch, such as one hundred threads to the inch. The mandrel 4 is secured upon one end of the shaft 2 and a drive pulley 5 adapted to receive the driving belt from the phonograph motor is secured to the opposite end of said shaft. The traveling sound box carriage 6 is sleeved on the usual guide rod 7, its forward edge resting upon the usual straight edge or track 8. There is a frame 9 which is formed with arms 10 and 11, which embrace the guide rod 7 and are clamped thereto by means of a screw 12. The forward portion of the frame 9 is provided with a screw 13 which is threaded therein and rests upon the top of the base 1. A bracket 14 is pivotally secured to the frame 9 by means of a pin 15 rigid with the bracket and passing through a bearing 16 formed in the frame 9, and in the boss 18 extending outwardly therefrom. A securing screw 17 is threaded in the end of said pin 15. The bracket 14 is provided with bearings 19 and 20, within which is journaled a shaft 21, to the forward end of which is secured a worm wheel 22. The teeth formed upon said wheel are of proper size and pitch for engaging the thread of the feed screw 3 and the same is held in engagement therewith by a spring 23 which is coiled around the boss 18 and secured at its ends to the frame 9 and bracket 14 as shown. Upon the rear end of the shaft 21 is fixed a spur gear 24, the diameter of which is preferably the same as that of the worm wheel 22.

A frame or support 25 is secured to the carriage 6 by screws 26, which screws also pass through and secure the feed nut spring 27 which carries at its forward end the feed nut 28 adapted to engage the feed screw 3. The support 25 is provided with a pair of downwardly extending ears or lugs 29 which receive a horizontal pin 30, upon which is hinged a frame 31 to which is secured a rack 32. A coil spring 33 is applied to the pin 30 and frame 31 in such a way as to normally press the rack 32 downward into engagement with the gear 24, as shown in Fig. 3. In this position the feed nut 28 is elevated so as to be out of engagement with the feed screw 3, and the rack 32 will be

ried along by the gear 21 driven by the shaft 21 and worm wheel 22, thereby imparting to the sound box carriage a progressive movement at a rate equal to one-half the pitch of the feed screw 3, which will enable the recorder or reproducer to operatively traverse a sound record having two hundred threads to the inch.

In order to release the rack 32 from engagement with the gear 21, there is a lever 34 which is pivoted at 35 to a lug 36 depending from the support 25. One end of this lever is provided with a pin 37, which engages a hole 38 of somewhat greater diameter formed in the frame 31. The opposite end of said lever 34 is formed with an inclined surface 39 which is engaged by an angular projection 40 depending from the pin 41 which is rotatably mounted in the support 25 and is provided with a milled head 42. When the pin 41 is rotated from the position of Fig. 3 through an angle of 90 degrees, it is brought into the position shown in Fig. 2 and by reason of the engagement of the projection 40 with the inclined surface 39, one end of the lever 34 is depressed, thus elevating the pin 37 and frame 31 and thereby moving the rack 32 out of engagement with the gear 24. The said movement of the lever 34 also depresses the screw 43 which is threaded therein and allows the feed nut 28 to descend into engagement with the feed screw 3, as shown in Fig. 2. The tension of the feed nut spring 27 is such as to hold the feed nut in yielding engagement with the feed screw in the usual manner when in the position of Fig. 2, and in the position of Fig. 3, the screw 43 presses against the lower surface of the feed nut spring and elevates the free end of the same so as to move the feed nut 28 out of engagement with the feed screw 3.

The pin 41 or its head 42 is preferably provided with a pointer 45, and indicating numerals 46 are applied to the upper surface of the supporting plate 25 for coöperating with the pointer 45 to designate the speed at which the carriage 6 will be moved; that is, when the pointer is opposite the figures 100 the parts will be in the position shown in Fig. 2, and the carriage will be fed at a rate suitable for operating upon records having one hundred threads per inch, and when the pointer is opposite the figures 200 the parts will be in the position shown in Fig. 3, and the carriage will be fed at a rate suitable for operating upon records having two hundred threads per inch.

Having now described my invention, what I claim is:

1. In a phonograph, the combination with the rotating mandrel, feed screw and traveling carriage, of a rotatable worm wheel in engagement with said feed screw, a spur gear driven by said worm wheel and a rack

carried by said carriage and adapted to be driven by said spur gear, substantially as set forth.

2. In a phonograph, the combination with the rotating mandrel, feed screw and traveling carriage, of a worm wheel driven by said feed screw, a spur gear driven by said worm wheel and a rack carried by said carriage and movable into and out of engagement with said spur gear, substantially as set forth.

3. In a phonograph, the combination of the rotating mandrel, traveling carriage, and means for imparting a progressive movement to the latter comprising a rack carried by the carriage, a rotating gear and means for moving said rack into and out of engagement with said gear, substantially as set forth.

4. In a phonograph, the combination of the rotating mandrel, traveling carriage, means for imparting a progressive movement to the latter consisting of a feed nut adapted to engage said feed screw, a rotating gear and a rack adapted to engage said gear, said rack and feed nut being movable respectively into and out of engagement with said gear and feed screw, substantially as set forth.

5. In a phonograph, the combination of the rotating mandrel, traveling carriage, and means for imparting a progressive movement to the latter consisting of a rack hinged to said carriage, and a rotating gear, a spring adapted to press said rack into engagement with said gear, and means for moving said rack against the pressure of said spring, substantially as set forth.

6. In a phonograph, the combination of the traveling carriage having the rack movably secured thereto, a feed nut secured to said carriage, and means carried by the carriage and adapted to simultaneously move the rack and feed nut, substantially as set forth.

7. In a phonograph, the combination of the traveling carriage, means for imparting a progressive movement thereto, comprising a movable rack and feed nut, and an indicator for designating the positions of said rack and feed nut, substantially as set forth.

8. An attachment for phonographs comprising a support 25 adapted to be secured to the traveling carriage, a frame 31 hinged to said support and a rack 32 secured to said frame, substantially as set forth.

9. An attachment for phonographs comprising a support 25 adapted to be secured to the traveling carriage, a frame 31 hinged to said support, a rack 32 secured to said frame, and means for moving said frame upon its hinge, substantially as set forth.

10. An attachment for phonographs comprising a support adapted to be secured to the traveling carriage, a rack hinged thereto, and means for moving said rack upon its

hinge and for simultaneously elevating the phonograph feed nut, substantially as set forth.

5 11. An attachment for phonographs, comprising a frame 9, a bracket 14 pivoted thereto, and a shaft 21 journaled in said bracket and provided with a worm wheel and gear 24, substantially as set forth.

10 12. An attachment for phonographs, comprising a frame 9 adapted to be applied to the guide rod, a bracket pivoted to said frame, a shaft journaled in said bracket and provided with a worm wheel, and a spring for holding the worm wheel in engagement
15 with the phonograph feed screw, substantially as set forth.

13. In a phonograph, the combination of the rotatable longitudinally immovable feed

screw and traveling carriage, with means for imparting progressive movement to the latter at either of two rates of speed, consisting of a feed nut and a rack carried by the carriage, gear means rotative from said feed screw, and means for moving said rack out of mesh with said gear means, and said nut into mesh with said screw, or for moving said rack into mesh with said gear means and said nut out of mesh with said screw at will, substantially as set forth.

This specification signed and witnessed this 4th day of Feby. 1908.

HERMAN WOLKE.

Witnesses:

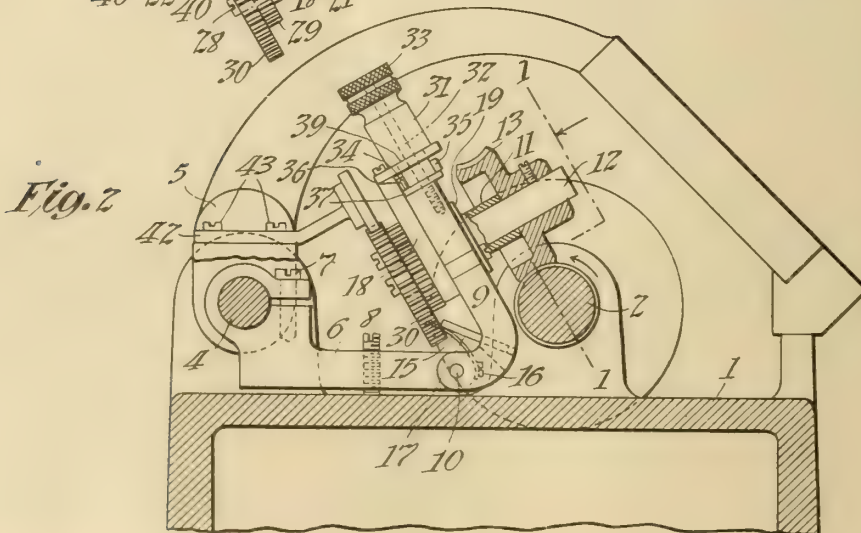
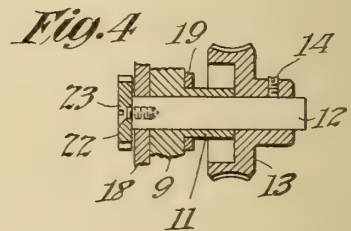
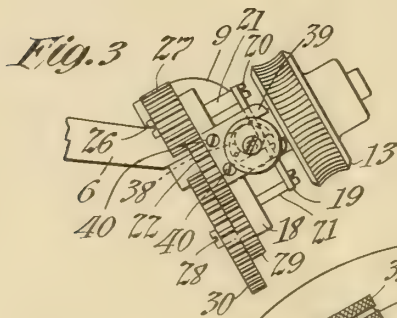
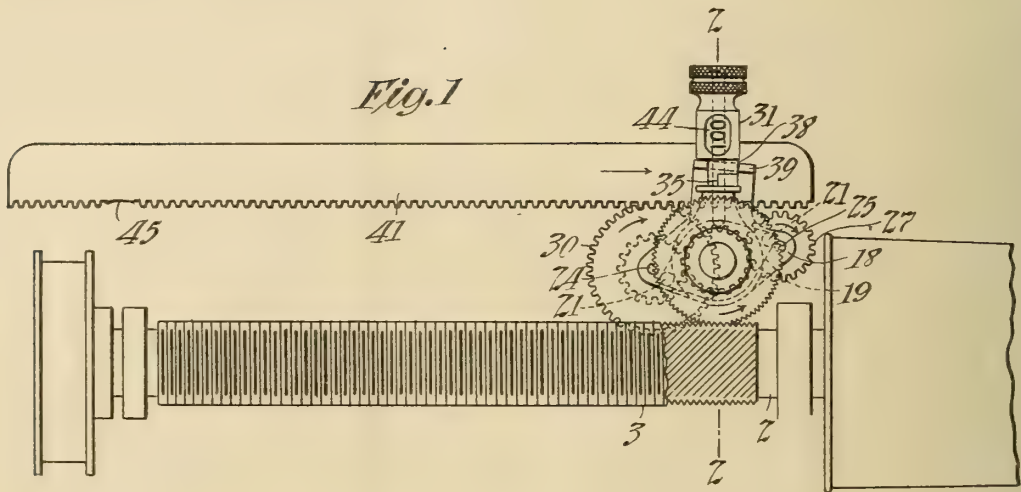
FRANK D. LEWIS,
H. H. DYKE.



H. WOLKE.
 PHONOGRAPH.
 APPLICATION FILED MAR. 24, 1908.

936,269.

Patented Oct. 5, 1909.



Witnesses:
 Frank D. Lewis
 Herbert A. Lyke

Inventor:
 Herman Wolke
 by Frank L. Lyke
 Atty.

UNITED STATES PATENT OFFICE.

HERMAN WOLKE, OF ORANGE, NEW JERSEY, ASSIGNOR TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

PHONOGRAPH.

936,269.

Specification of Letters Patent.

Patented Oct. 5, 1909.

Application filed March 24, 1908. Serial No. 422,876.

To all whom it may concern:

Be it known that I, HERMAN WOLKE, a citizen of the United States, and a resident of Orange, in the county of Essex and State

of New Jersey, have invented certain new and useful Improvements in Phonographs, of which the following is a description.

My invention relates to phonographs, and has for its object the provision of means whereby the traveling carriage which carries the reproducer or recorder, may be fed at either of two desired rates of speed, so as to adapt it to operate, for example, upon records having respectively one hundred and two hundred threads per inch, and said means are preferably designed so that they may be readily applied to phonographs of ordinary construction, such as are now in general use throughout this and other countries.

In order that the invention may be more fully understood, reference is hereby made to the accompanying drawing of which—

Figure 1 is a section on line 1—1 of Fig. 2, viewed in the direction indicated by the arrow; Fig. 2 is a section on line 2—2 of Fig. 1 showing my invention applied to a phonograph of well-known form; Fig. 3 is a detail view of the gears for feeding the traveling carriage as viewed in a direction at right angles to Fig. 2, and Fig. 4 is a sectional detail of the worm gear and adjacent parts.

The phonograph shown is of ordinary form and comprises a base or body 1 which supports the main shaft 2 formed with a feed screw 3, which is generally of fine pitch, such as 100 threads to the inch. The body 1 also carries the back rod 4, upon which the sound box carriage 5 is slidably mounted in the usual manner. There is an arm 6 which is removably applied to the back rod 4, being held by a clamping screw 7. A screw 8 is threaded in said arm so that its lower end rests upon the body 1 and affords an angular adjustment with respect to the back rod 4. A frame 9 is pivoted at 10 to the arm 6 and said frame is formed with a bearing 11 in which is journaled a shaft 12, to which a worm gear 13 is secured by the set screw 14, said worm gear meshing with the thread of the feed screw 3, and being held in yielding engagement therewith by the action of a spring 15 which is secured to the end of the arm 6 by the screw 16, and

presses against a pin or abutment 17 secured to the frame 9.

There is an auxiliary frame composed of two plates 18 and 19, which are secured together by screws 20 threaded in posts 21 which are rigid with the plate 18, and against the ends of which the plate 19 is clamped by the said screws. The plate 18 oscillates upon the shaft 12 between the bearing 11 and a spur gear 22 which is secured to the end of the shaft 12 by a screw 23. The plate 18 is provided with a pair of pins or studs 24 and 25. Upon the pin 25 and secured by the screw 26 is rotatably mounted a spur gear 27 meshing with the gear 22, and upon the pin 24 and secured by the screw 28 is a pair of spur gears 29 and 30 secured together, the gear 29 meshing with the gear 22. The gears 22, 27 and 29 are preferably all of the same diameter and the gear 30 twice the diameter of said gears.

Means are provided for oscillating the plate 18, and as shown comprises a sleeve 31 rotatably mounted on a pin 32 which is threaded in the frame 9. One end of said sleeve is provided with a milled head 33 and the opposite end is cut away to form a pair of shoulders 34 and 35 which are adapted to abut against a pin 36 carried by a plate 37 secured to the frame 9, in order to limit the angular movement of the sleeve 31 in either direction. A cam surface or eccentric 38 is formed upon the sleeve 31, near its lower end, the same being situated between the arms of a yoke 39 which is secured to the plate 18 by screws 40. This eccentric bears against the arms of said yoke as the sleeve 31 is oscillated upon the pin 32 and thereby causes oscillation of the plate 18 upon its axis, which brings the gears 27 and 30 respectively into and out of engagement with a rack 41, which is secured to an arm 42, and which is in turn secured to the sound box carriage 5 by screws 43. This rack has a cutaway portion 45 near one end thereof of sufficient extent to effect a disengagement of the gear 27 with the rack when that point is reached, but which does not effect the engagement of the gear 30, owing to its greater diameter. Indicating figures 44 are preferably applied to the opposite sides of the sleeve 31 to designate the rate of feed of the sound box carriage.

The operation of the device is as follows: When the parts are in the positions shown in

Figs. 1 and 2 the gear 30 is in engagement with the rack 41 and is rotated by the gears 22 and 29, by reason of the engagement of the worm gear 13 with the feed screw 3, and the carriage is fed forward at a rate which is equal to the pitch of the feed screw for each revolution thereof, or one one-hundredth of an inch. The indicia 44, which are visible at this time are the figures 100, which means that the rate of feed of the sound box carriage is suitable for operating upon records having one hundred threads per inch. When the sleeve 31 is rotated through an angle of 180° the figures 200 (not shown) will come into view, and at the same time the plate 18 will be oscillated to such an extent as to remove the gear 30 from engagement with the rack 41, and to bring into engagement with said rack the gear 27, which gear is driven by the gear 22 by reason of the engagement of the worm wheel 13 with the feed screw 3. In this position of the parts, the sound box carriage will be driven at a slower rate of speed than before and preferably at a rate which is equal to one half the pitch of the feed screw for each revolution thereof, so as to adapt the sound box carriage to operate upon the records having two hundred threads to the inch, as indicated by the figures upon the sleeve 31. It is obvious that all that is necessary to do, in order to change the rate of feed of the sound box carriage is to rotate the sleeve 31 through an angle of 180°, so as to oscillate the plate 18, which movement does not affect in any way the position of the frame 9 or the worm wheel 13. The length and position of the rack 41 is such and the cut-away portion 45 is so situated that no matter whether the gear 27 or the gear 30 is feeding the carriage the rack 41 will be automatically disengaged from the feeding gear whenever the sound box reaches the end of the record surface.

Having now described my invention, what I claim is:

1. In a phonograph, the combination of the rotating feed screw and traveling carriage, a rack, a pair of gears movable one into and the other out of engagement with said rack, or vice versa, said rack and gears constituting coöperating members, one element of said members being carried by said carriage, and the other element being immovable in the direction of movement of said carriage, and means for operatively connecting said gears with said feed screw, substantially as set forth.

2. In a phonograph, the combination of the rotating feed screw and traveling carriage, a rack, a pair of gears movable into and out of engagement with said rack at different points along the length thereof, said rack or gears being immovable in the direction of movement of said carriage and the coöperating member or members moving

with said carriage and means for operatively connecting said gears with said feed screw, substantially as set forth.

3. In a phonograph, the combination of the rotating feed screw and traveling carriage, a rack, a pair of gears of different diameters movable into and out of engagement therewith, said rack and gears constituting coöperating members, one element of said members being carried by said carriage, and the other element being immovable in the direction of movement of said carriage and means for operatively connecting said gears with said feed screw, substantially as set forth.

4. In a phonograph, the combination of a rotating feed screw and traveling carriage, a rack, a pair of gears movable into and out of engagement with said rack carried by said carriage at different points along the length thereof, said rack being cut-away near one end to a sufficient extent as to effect the disengagement of the smaller gear without affecting the engagement of the larger gear and means for operatively connecting said gears with said feed screw, substantially as set forth.

5. In a phonograph, the combination of the rotating feed screw and traveling carriage, a rack carried by said carriage, a pivotal support carrying a pair of rotatably mounted gears moved into and out of engagement with said rack when said support is turned on its pivot, and means concentric with the pivot of said support for operatively connecting said gears with said feed screw, substantially as set forth.

6. In a phonograph, the combination of the rotating feed screw and traveling carriage, a rack carried by said carriage, a pivotal support carrying a pair of rotatably mounted gears moved into and out of engagement with said rack when said support is turned on its pivot, means concentric with the pivot of said support for operatively connecting said gears with said feed screw, and means for oscillating said support, substantially as set forth.

7. In a phonograph, the combination of the rotating feed screw and traveling carriage, a rack carried by said carriage, a spring-pressed frame carrying a worm gear in engagement with said feed screw, an auxiliary frame applied to said spring-pressed frame and provided with a pair of spur gears adapted to be brought into and out of engagement with said rack, and a driving connection between said worm gear and said spur gears, substantially as set forth.

8. In a phonograph, the combination of the rotating feed screw and traveling carriage, a rack carried by said carriage, a spring pressed frame, a worm gear rotatably mounted thereon in engagement with said

feed screw, an auxiliary frame pivotally connected to said spring pressed frame, a pair of spur gears rotatably mounted upon said pivotal frame, and a driving connection
5 between said worm gear and said spur gears, substantially as set forth.

9. In a phonograph, the combination of the body, rotatable feed screw and traveling carriage, a support 6 removably secured to
10 said body, a frame 9 hinged thereto, a worm gear rotatably mounted on said frame, a rack carried by said carriage, and means operatively connected with said worm gear for engaging said rack to feed the carriage,
15 substantially as set forth.

10. In a phonograph, the combination with the rotating feed screw, back rod and carriage sleeved thereon, of an arm 6 sleeved on said back rod and provided with a screw
20 8 adapted to rest upon the body of the phonograph, a frame 9 pivoted to said arm, a worm gear rotatably mounted on said frame and adapted to engage said feed screw, and means secured to said carriage and opera-
25 tively connected with said worm gear, substantially as set forth.

11. In a phonograph, the combination of the rotating feed screw and traveling carriage, a frame carrying a worm gear engaging said feed screw, an auxiliary frame mov-
30 ably connected to said frame, an oscillating sleeve applied to one of said frames and having a cam surface in engagement with the other frame, an abutment carried by said carriage, interchangeable means carried by
35 said last named frame for engaging said abutment and connections between said worm gear and interchangeable means, substantially as set forth.

12. In a phonograph, the combination of the rotating feed screw and traveling carriage, a frame carrying a worm gear engaging said feed screw, an auxiliary frame mov-
40 ably connected to said main frame, an oscillating sleeve applied to one of said frames and having a cam surface in engagement

with the other frame, connections between said worm gear and said carriage including interchangeable means carried by said last
50 named frame and means for limiting the angular movement of said sleeve in both directions, substantially as set forth.

13. In a phonograph, the combination of the rotating feed screw and traveling carriage, a main frame carrying a worm gear
55 engaging said feed screw, an auxiliary frame movably connected to said main frame, an oscillating sleeve applied to one of said frames and having a cam surface in engagement with the other frame, connections be-
60 tween said worm gear and said carriage including interchangeable means carried by said last named frame, said sleeve having indicia applied thereto for designating the rate of feed of the traveling carriage, sub-
65 stantially as set forth.

14. An attachment for phonographs comprising an arm 6 adapted to be secured to the back rod of the phonograph, a frame 9
70 pivoted to said arm, a worm gear rotatably mounted on said frame in such position as to engage the feed screw and a pair of spur gears operatively connected with said worm gear and movable with respect to said frame
75 9, substantially as set forth.

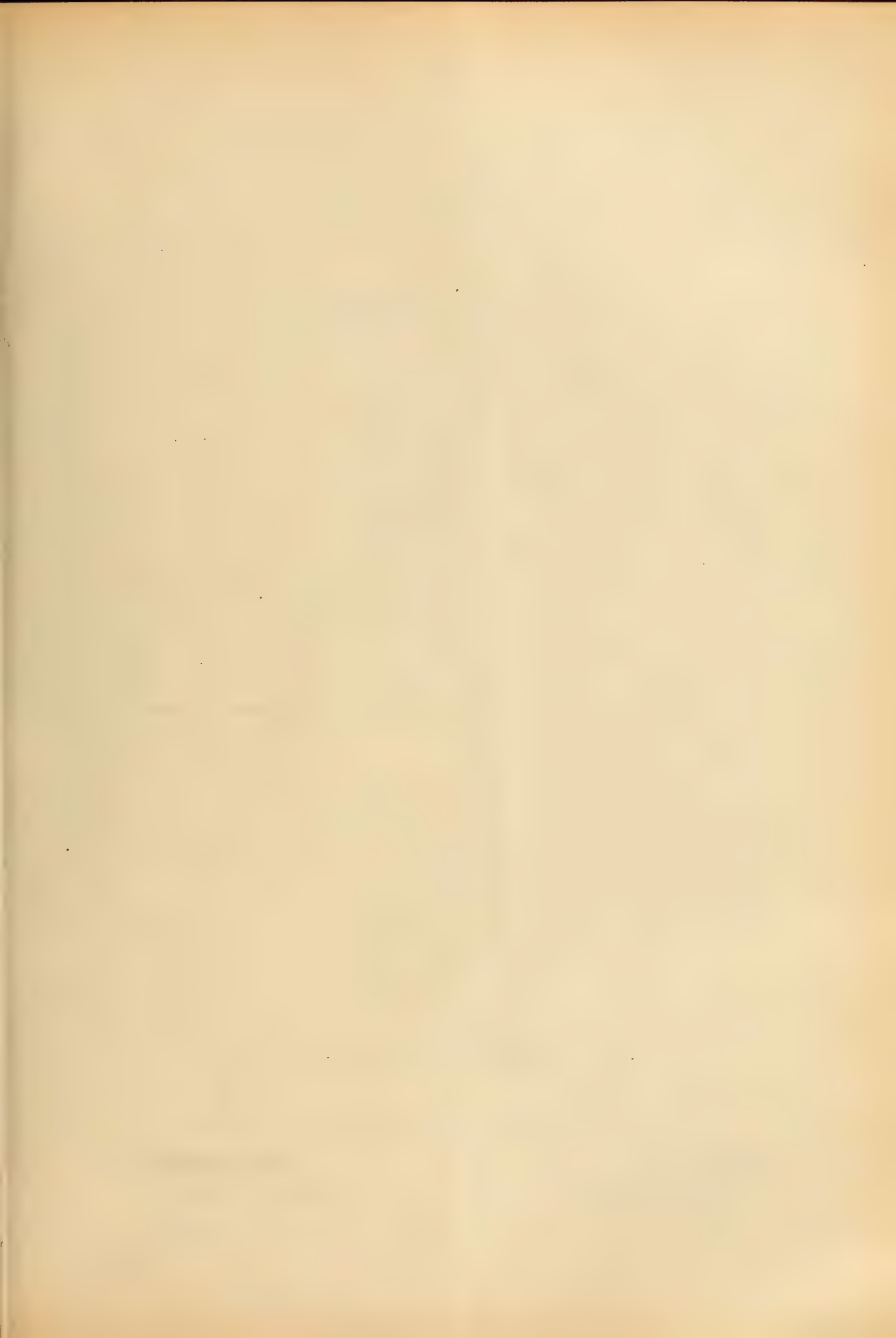
15. An attachment for phonographs, comprising a member 6 adapted to be fixed to the phonograph body, a frame 9 pivoted
80 thereto, a worm gear rotatably mounted on said frame in such position as to engage the feed screw of the phonograph, a frame pivotally mounted on said frame 9 and carrying a pair of gears operatively connected with said worm gear, and means carried by said
85 frame 9 for moving the said auxiliary frame, substantially as set forth.

This specification signed and witnessed this 23rd day of March 1908.

HERMAN WOLKE.

Witnesses:

FRANK D. LEWIS,
H. H. DYKE.



J. F. OTT.
FEED MECHANISM FOR PHONOGRAPHS.
APPLICATION FILED JAN. 20, 1908.

936,270.

Patented Oct. 5, 1909.

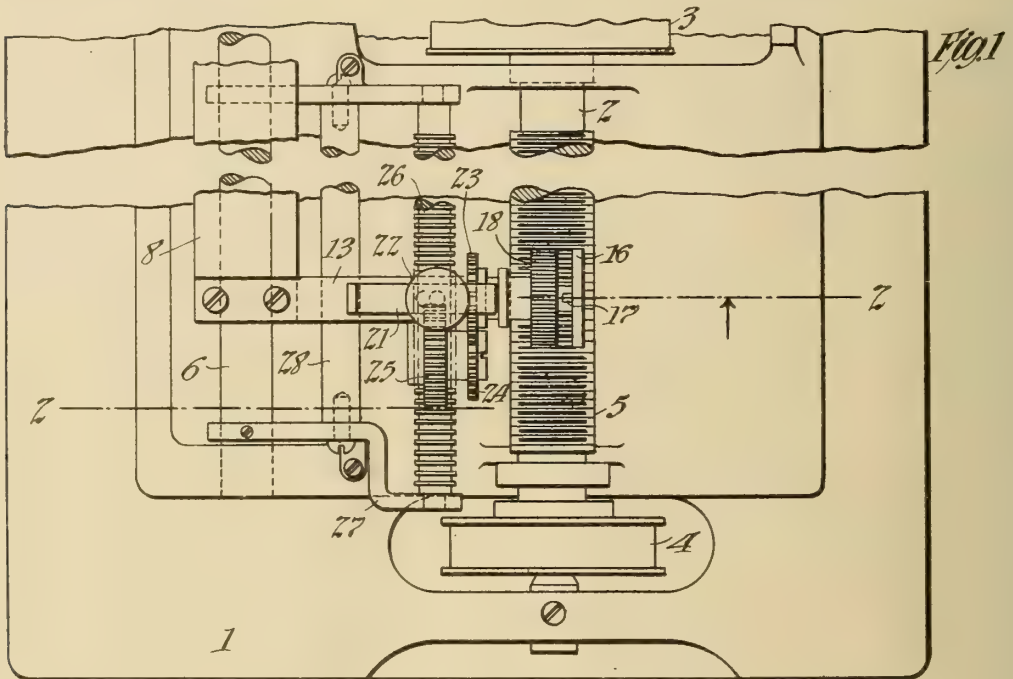
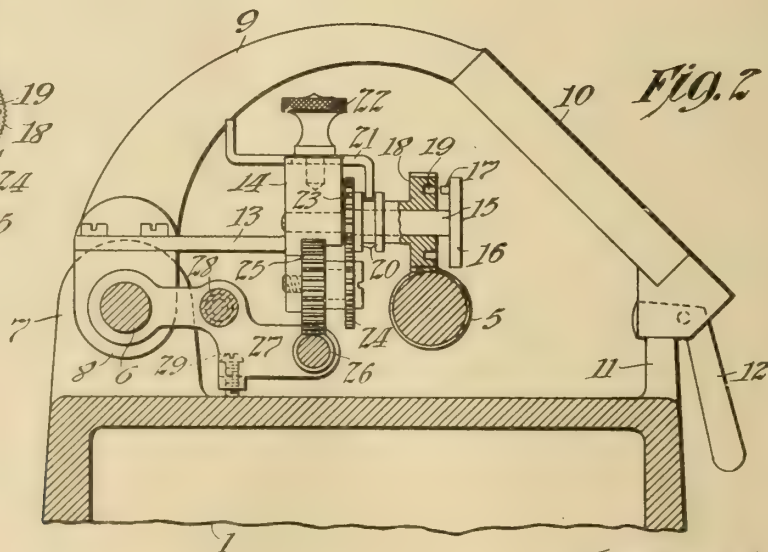
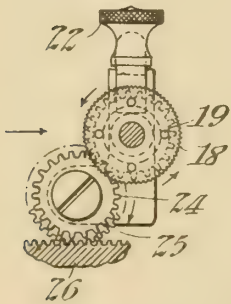


Fig. 3



Witnesses:
Frank D. Gurs
H. H. Dyke

Inventor:
John F. Ott
By Frank T. Gurs
Atty.

UNITED STATES PATENT OFFICE.

JOHN F. OTT, OF ORANGE, NEW JERSEY, ASSIGNOR TO NEW JERSEY PATENT COMPANY,
OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

FEED MECHANISM FOR PHONOGRAPHS.

936,270.

Specification of Letters Patent.

Patented Oct. 5, 1909.

Application filed January 20, 1908. Serial No. 411,834.

To all whom it may concern:

Be it known that I, JOHN F. OTT, a citizen of the United States, and a resident of Orange, county of Essex, and State of New Jersey, have invented certain new and useful Improvements in Feeding Mechanism for Phonographs, of which the following is a description.

My invention relates to various new and useful improvements in phonographs, and particularly to means whereby the carriage may be fed with respect to the record or blank at two distinct rates of movement, corresponding preferably to one hundred threads per inch and two hundred threads per inch respectively.

The improved mechanism is of the type disclosed in application of Herman Wolke, filed September 12, 1907, Serial No. 392,480, wherein the faster movement of the carriage is effected by the direct feeding of a worm locked against rotation and engaged by a feed screw, so that the worm acts practically as a nut; while the slower movement is secured by a differential action, the worm being rotated by the feed screw, and effecting longitudinal movement with respect to a stationary abutment.

The object of my invention is to provide an improved mechanism for the purpose which can be applied as a separate attachment to a phonograph and which shall be of simple construction and efficient in operation.

The present improvements have been designed particularly for use with phonographs of the Home type, in which the feed screw is formed on the mandrel shaft, but, with suitable modifications, the improvements may be applied to other types of talking machines without departing from the spirit of my invention.

In order that the invention may be better understood, attention is directed to the accompanying drawings in which—

Figure 1, is a plan view of a portion of a Home phonograph, embodying my present improvements in their preferred form; Fig. 2, a cross-sectional view on the line 2—2 of Fig. 1; and Fig. 3, a front view of the worm and differential gearing.

In the above views, corresponding parts are represented by the same numerals of reference.

The phonograph is provided with the

usual bed plate 1, on which is mounted the shaft 2, carrying the mandrel 3, and driven by a pulley 4, in the usual way. The shaft 2 is formed with the ordinary feed screw 5. The usual guide rod 6, is mounted in the standard 7, and longitudinally movable on the guide rod is the sleeve 8 from which extends the arm 9, formed with an eye 10, for receiving the recording or reproducing device, the forward end of the arm 9 traveling on a straight edge 11, with which engages a cam lift lever 12, all of these elements being of the usual construction. Ordinarily a flat spring extends forwardly from the top of the sleeve 8, and carries a nut which engages the feed screw 5, but this spring and nut are removed to make way for the present attachment. Instead of the spring, I make use of an arm 13, carrying at its forward end a block 14, from which extends a stationary stub shaft 15, having at its extremity a disk 16, provided with an inwardly extending pin 17. Mounted on the shaft 15 is a worm wheel 18, formed with a plurality of openings 19, (four being shown) with one of which the pin 17, is adapted to engage when the worm wheel is moved forwardly. The sleeve of the worm wheel 18 is provided with a pair of rings 20, between which engages the down turned end of the adjusting arm 21, adapted to be clamped in position by a thumb nut 22. By moving the adjusting arm forwardly, the worm wheel 18 may be moved to engage one of the openings 19 with the pin 17, so as to lock the worm wheel to the stationary disk 16. This movement of the worm wheel does not affect its engagement with the feed screw 5. The inner end of the worm sleeve carries a gear 23, which when the worm wheel is in the position shown in Fig. 2, meshes with and drives a gear 24 connected to the gear 25. In order to secure a differential feed movement from the worm wheel 18, when the latter is permitted to turn freely, an abutment should be provided with which the gear 25 or gear 24 may engage, and in the present case this abutment is a rack 26 (illustrated as a round bar with parallel teeth cut thereon) which is carried in arms 27 hung on the guide rod 6, and suitably stiffened by a connecting brace 28, thereby forming practically a rigid frame for supporting the rack 26. This frame may be adjusted by a screw 29, so that when the worm

wheel 18 engages the feed screw 5, the gear 25 will engage the rack 26. When the parts are in the position shown in Figs. 1 and 2, a differential feed is effected, the worm wheel being rotated by the feed screw and rotating the gears 23, 24, and 25, so as to cause the gear 25 to travel slowly in a longitudinal direction with respect to the rack and effect a feed movement of the carriage at a very slow rate. With the parts of the proportion shown in the drawings, such a feed movement will be equivalent to a direct feed of two hundred threads per inch. When, however, the worm wheel 18 is shifted forwardly so as to cause the pin 17 to enter one of the openings 19 to lock the worm wheel, it will act practically as a stationary nut and permit the carriage to be fed directly to the feed screw. It will be observed that when the worm wheel is thus moved forwardly, the gear 23 will be withdrawn from mesh with the gear 24, so as to permit the gears 24 and 25 to turn freely as the carriage is advanced by the direct feed movement, as will be understood.

Having now described my invention what I claim as new and desire to secure by Letters Patent, is as follows:—

1. In a feeding mechanism for phonographs, the combination with a movable carriage and a feed screw, of a worm wheel connected to the carriage and movable therewith and engaging said feed screw, a stationary abutment extending parallel to the feed screw, a wheel engaging the abutment and movable longitudinally of the same, connections between the worm wheel and said wheel, and means for locking the worm wheel against rotation and for simultaneously breaking the connections between the worm wheel and wheel, substantially as set forth.

2. In a feeding mechanism for phonographs, the combination of a movable carriage and a feed screw, of a worm wheel con-

nected to the carriage and movable therewith and engaging said feed screw, a stationary abutment extending parallel to the feed screw, a wheel engaging the abutment and movable longitudinally of the same, connections between the worm wheel and said wheel, means for locking the worm wheel against rotation and for simultaneously breaking the connections between the worm wheel and wheel, and means for adjusting the abutment with respect to said wheel, substantially as set forth.

3. In a feeding mechanism for phonographs, the combination of a movable carriage and a feed screw, of a worm wheel connected with the carriage and engaging said feed screw, a stationary abutment extending parallel with the feed screw, a pair of inter-meshing gears, one connected to the worm wheel and the other coöperating with the abutment, and means for shifting the worm wheel longitudinally so as to disengage said gears and simultaneously lock the worm wheel against rotation, substantially as set forth.

4. In a feeding mechanism for phonographs, the combination with a movable carriage and a feed screw, of a worm wheel connected with the carriage and engaging said feed screw, a stationary abutment extending parallel with the feed screw, a pair of inter-meshing gears, one connected to the worm wheel and the other coöperating with the abutment, means for shifting the worm wheel longitudinally so as to disengage said gears and simultaneously lock the worm wheel against rotation, and means for locking the worm wheel in either of its extreme positions, substantially as set forth.

This specification signed and witnessed this 13th day of Jan. 1908.

JOHN F. OTT.

Witnesses:

FRANK D. LEWIS.

H. H. DYKE.

J. F. OTT.
PHONOGRAPH.

APPLICATION FILED MAR. 24, 1908.

936,271.

Patented Oct. 5, 1909.

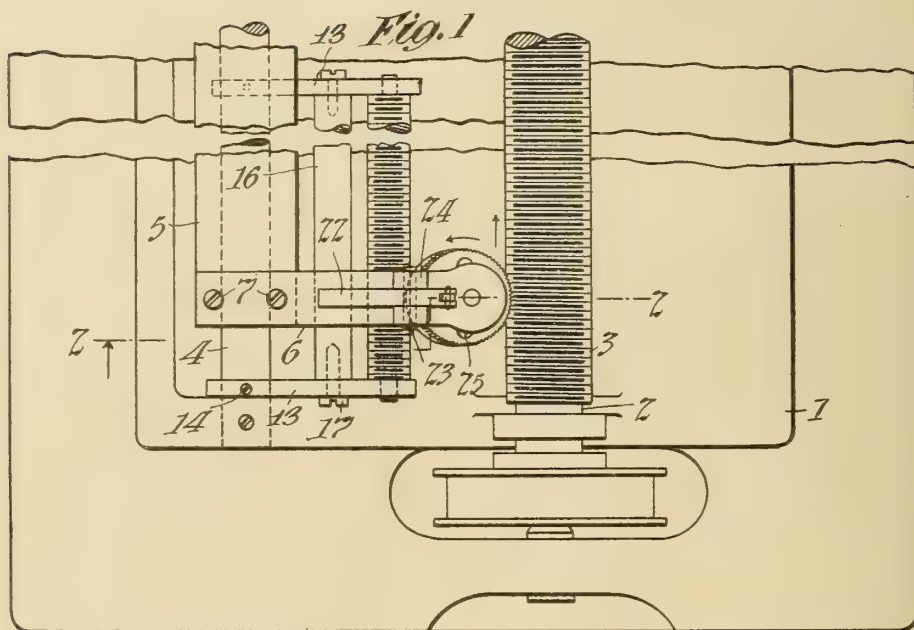


Fig. 3

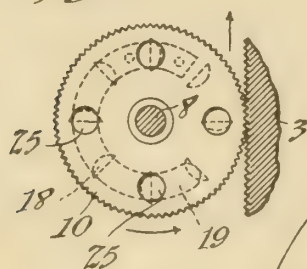


Fig. 2

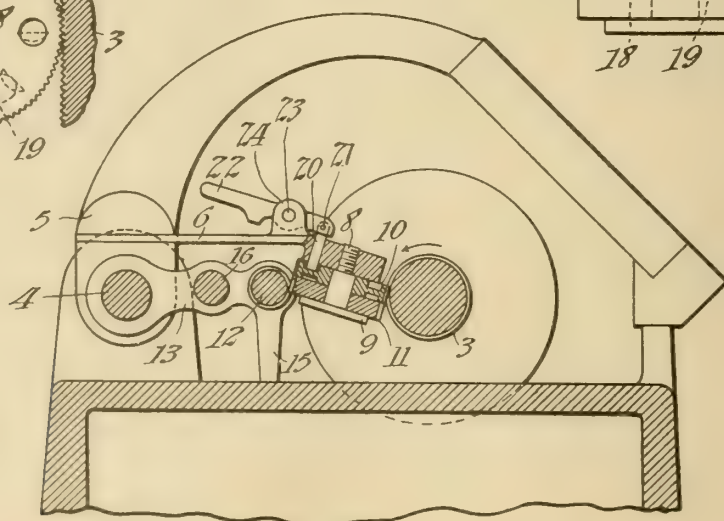
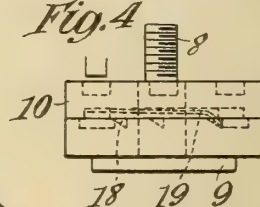


Fig. 4



Witnesses:

Frank O. Lewis
Harbert H. Dyke

Inventor:

John F. Ott
by Frank L. Roper
Atty.

UNITED STATES PATENT OFFICE.

JOHN F. OTT, OF ORANGE, NEW JERSEY, ASSIGNOR TO NEW JERSEY PATENT COMPANY,
OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

PHONOGRAPH.

936,271.

Specification of Letters Patent.

Patented Oct. 5, 1909.

Application filed March 24, 1908. Serial No. 422,931.

To all whom it may concern:

Be it known that I, JOHN F. OTT, a citizen of the United States, and a resident of Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Phonographs, of which the following is a description.

My invention relates to phonographs and has for its object the provision of means whereby the traveling carriage which carries the reproducer or recorder may be fed at either of two desired rates of speed, so as to adapt it to operate, for example, upon records having one-hundred and two-hundred threads per inch, and said means are preferably designed so that they may be readily applied to phonographs of ordinary construction, such as are now in general use throughout this and other countries.

In order that my invention may be more fully understood, reference is hereby made to the accompanying drawing of which—

Figure 1 is a plan view of a portion of a phonograph to which my invention is applied; Fig. 2 is a section on line 2—2 of Fig. 1; Fig. 3 is a detail plan view of the rotary member which engages the feed screw of the phonograph and Fig. 4 is a side elevation of the same.

The phonograph shown is of ordinary form and comprises a base or body 1 which supports the main shaft 2 formed with the feed screw 3 which is generally of fine pitch, such as one-hundred threads to the inch. The body 1 also carries the back rod 4 upon which the sound box carriage 5 is slidably mounted in the usual manner. An arm 6 is secured at its rear end to the carriage 5 in any suitable manner, as by screws 7. The forward end of said arm is provided with a pin or stud 8 extending downwardly and provided with a head 9. Upon said stud are rotatably mounted a worm wheel 10 which engages the thread of the feed screw 3 and a spur gear 11 which engages a rack 12 fixedly applied to the back rod 4 by the supporting arms 13. These arms are preferably secured to the back rod by set screws 14, and are provided with depending feet 15 which rest upon the body 1. Said arms are united by a cross-rod 16 secured to said arms by screws 17. The gear 11 is formed with a set of ratchet teeth or notches 18 which are adapted to be engaged by a spring pawl 19, secured to the worm gear 10. Means are

provided for securing the worm gear 10 against rotation and, as shown, comprise a pin 20 pivoted at 21 to a lever 22, said lever being pivoted at 23 to a pair of ears 24 formed integral with the arm 6. The worm gear 10 is provided with one or more sockets or recesses 25 each of which is adapted to receive the end of the pin 20, said recesses being shown as four in number.

The operation of the device is as follows: When the parts occupy the positions shown in Fig. 2, the worm gear 10 is held against rotation by the pin 20 and by reason of its engagement with the feed screw 3, the carriage 5 will be fed a distance equal to the pitch of the feed screw at each revolution thereof, that is, one one-hundredth of an inch, when the feed screw is of the usual form. At this time the spur gear 11 is merely an idler which will be caused to rotate by reason of its engagement with the rack 12 but which rotation will have no effect upon the worm gear 10 by reason of the ratchet teeth 18 slipping by the spring pawl 19. When the free end of the lever 22 is depressed the pin 20 will be removed from engagement with the socket 25 of the worm gear 10 and held in such position by frictional engagement with the bore which it occupies in the arm 6, and the gear 10 will therefore be rotated by the feed screw 3, and by reason of the engagement of the pawl 19 with one of the ratchet teeth 18, the gear 11 will be driven and by its engagement with the rack 12 will impart a forward progressive movement to the carriage 5, the rate of which when its diameter is the same as that of the worm gear 10 will be one-half of that previously described, that is, one two-hundredth of an inch for each revolution of the feed screw.

Having now described my invention, what I claim is:

1. In a phonograph, the combination of the rotating feed screw and traveling carriage, and means for feeding the same comprising a worm gear carried by the carriage and engaging said feed screw, a rack, a spur gear engaging said rack, means for locking said worm gear against rotation, and a ratchet connection between said worm gear and spur gear, substantially as set forth.

2. In a phonograph, the combination of the rotating feed screw and traveling carriage, and means for feeding the same com-

prising a worm gear movable with said carriage and in engagement with said feed screw, means for locking said worm gear against rotation, a rotary member carried by said carriage and driven by said worm gear through a one-way connection when the locking means is withdrawn, for feeding said carriage at a different rate from that imparted to it by the worm gear when locked against rotation and an abutment with which said rotary member coöperates, substantially as set forth.

3. In a phonograph, the combination of the rotating feed screw and traveling carriage, a worm gear for feeding said carriage thereby and in engagement with said feed screw, means for locking said worm gear against rotation, and a rotary member operatively connected to said worm gear and adapted to be driven thereby when the said locking means is withdrawn, substantially as set forth.

4. In a phonograph, the combination of the rotating feed screw and traveling carriage, a rotary member carried by the carriage in engagement with the said feed screw, removable means for locking said rotary member against rotation, a second rotary member carried by said carriage, a pawl and ratchet connection between said rotary members and a member with which said second member engages, substantially as set forth.

5. In a phonograph, the combination of the traveling carriage, the arm 6 extending forwardly therefrom, the worm gear 10 rotatably mounted at the forward end of said

arm and formed with a socket 25, a pin 20 movable into and out of said socket for locking said gear against rotation, means holding said pin against lateral movement and a feed screw with which said worm gear engages, substantially as set forth.

6. An attachment for phonographs comprising an arm 6 adapted to be secured to the traveling carriage, gears 10 and 11 rotatably mounted on said arm, a driving connection between said gears, and means for locking said gear 10 against rotation, substantially as set forth.

7. An attachment for phonographs comprising a pair of arms 13 adapted to be sleeved upon the back rod of the phonograph, a rack carried thereby, and feet 15 applied to said arms and adapted to rest upon the body of the phonograph, substantially as set forth.

8. An attachment for phonographs comprising an arm adapted to be secured to the traveling carriage, a worm gear rotatably mounted at the forward end of said arm adapted to engage the feed screw and formed with a socket therein, a pin movable into and out of said socket for locking said gear against rotation, and a pivoted lever mounted on said arm to one end of which said pin is secured, substantially as set forth.

This specification signed and witnessed this 23 day of March 1908.

JOHN F. OTT.

Witnesses:

FRANK D. LEWIS.

H. H. DYKE.

J. F. OTT.
PHONOGRAPH.

APPLICATION FILED APR. 15, 1908.

936,272.

Patented Oct. 5, 1909.

Fig. 1

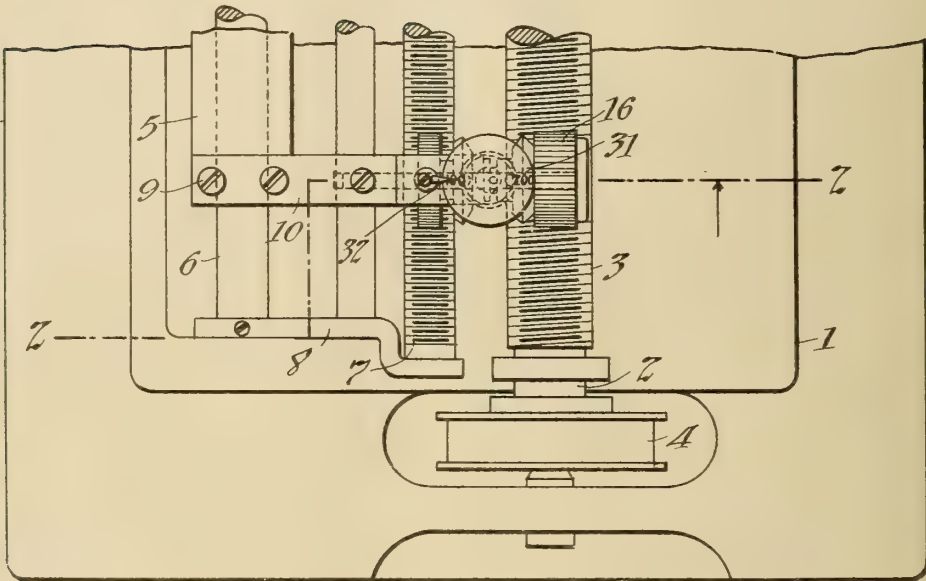
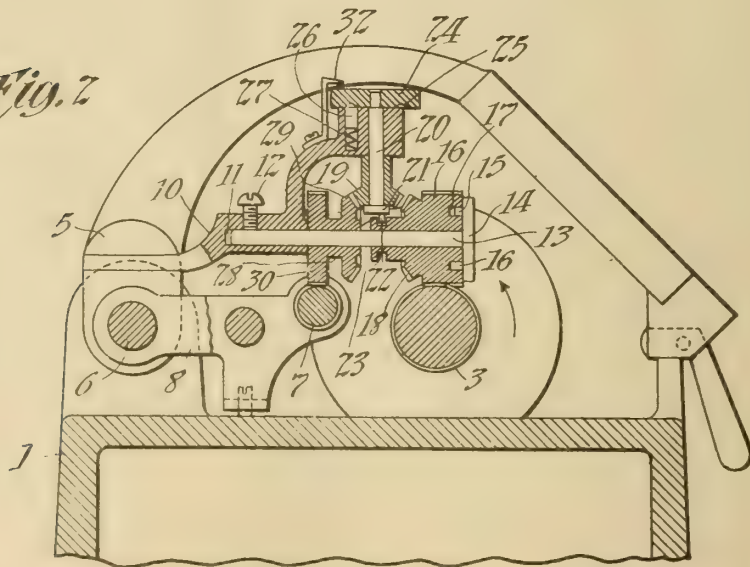


Fig. 2



Witnesses:

Frank D. Lewis
John H. Langford

Inventor:

John F. Ott
by Frank L. Dyer
Atty.

UNITED STATES PATENT OFFICE.

JOHN F. OTT, OF ORANGE, NEW JERSEY, ASSIGNOR TO NEW JERSEY PATENT COMPANY,
OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

PHONOGRAPH.

936,272.

Specification of Letters Patent.

Patented Oct. 5, 1909.

Application filed April 15, 1908. Serial No. 427,223.

To all whom it may concern:

Be it known that I, JOHN F. OTT, a citizen of the United States, and a resident of Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Phonographs, of which the following is a description.

My invention relates to means adapted to cooperate with the feed screw of a phonograph for imparting a progressive movement to the sound box carriage and comprises interchangeable means for feeding the same at either of two desired rates of speed, as for example at speeds suitable for operating upon records having either one-hundred or two hundred threads per inch.

My invention relates more particularly to feeding mechanism of the general type shown and broadly claimed in an application filed by me on January 20, 1908, Serial No. 411,834, and has for its object the provision of improved means for locking the worm gear against rotation, for unlocking the same and transmitting the rotation thereof to a gear which cooperates with a rack or abutment for feeding the carriage, for shifting or sliding the worm gear and for locking said shifting means, all as will be more particularly set forth and claimed.

Reference is hereby made to the accompanying drawing of which—

Figure 1 is a plan view of a portion of a phonograph showing my invention applied thereto, and Fig. 2 is a section on line 2—2 of Fig. 1.

The phonograph shown is of ordinary form and comprises a base or body 1, a main shaft 2 journaled therein and provided with a feed screw 3 of fine pitch, such as one-hundred threads per inch, and a drive pulley 4. The sound box carriage 5 slides upon the back rod 6 and there is a fixed rack or abutment 7 carried by a frame 8 which is secured to the rod 6. Secured to the carriage 5 by the screws 9, and extending forwardly therefrom, is an arm 10. This arm is provided with a socket 11, and within the same and secured by the set screw 12 is a forwardly extending pin 13 which carries at its end a locking disk 14 having a stud 15. There is a worm gear 16 journaled on said pin 13 and engaging the thread of the feed screw 3. This gear is slidable along the pin 13. There

are a number of sockets 17 formed in the face of the worm gear 16, each of which is adapted to receive the stud 15 of the disk 14 for locking these parts together when the gear 16 is in its extreme forward position. Integral with said gear is a bevel gear 18 which is adapted to engage a similar gear 19 when the gear 16 is in its extreme rearward position. In this position the disk 14 and gear 16 are out of locking relation and the gear 18 rotates the gear 19. The last named gear is journaled on a vertical pin 20, the lower end of which is provided with a disk 21 which supports the gear 19 and there is a pin 22 extending downward from said disk into engagement with a groove 23, formed on the hub of the gear 16. The upper end of the pin 20 is provided with a head 24, in the lower surface of which are formed a number of notches or depressions 25 adapted to receive the upper end of a locking bolt 26 situated within a socket formed in the arm 10 and pressed upward by a spring 27.

There is a sleeve 28 rotatable upon the pin 13 and formed with a bevel gear 29 which engages the gear 19, and with a spur gear 30 which engages the rack 7. The head 24 is provided with indicating numerals or indicia 31 which cooperate with a pointer 32 secured to the arm 10 for designating the rate of feed of the sound box carriage.

When the parts are in the position shown in Fig. 2, the worm gear 16 is locked to the disk 14, being held in locked position by the pin 20 and stud 23 carried thereby. In this position the worm gear 16 is incapable of rotation and therefore acts as an ordinary feed nut to feed the carriage at a rate suitable for operating upon records having one hundred threads to the inch, and the indicating numerals 31 upon the head 24 are opposite the pointer 32. When the head 24 and pin 20 are rotated through an angle of 180° the worm gear 16 is unlocked from the disk 14 and the bevel gear 18 brought into mesh with the gear 19. With the parts in this position the gear 16 is rotated by the feed screw 3 and imparts a rotation in the opposite direction to the spur gear 30 and the latter by reason of its engagement with the rack 7, imparts a forward progressive movement to the sound box carriage at a rate suitable for operating upon records having two hun-

dred threads per inch, said rate of speed being designated by the numerals 200 which are then opposite the pointer 32.

Having now described my invention, what I claim is:

1. In a phonograph, the combination of the rotating feed screw and traveling carriage, of means for operatively connecting the same for progressing the carriage at different speeds comprising a worm gear in engagement with said feed screw and carried by said carriage, rotary means engaging an abutment, and rotary means for interchangeably locking said worm gear and unlocking the same and operatively connecting it with said abutment engaging means, substantially as set forth.

2. In a feeding mechanism for phonographs, the combination with the feed screw and movable carriage, of a worm gear connected to the carriage and movable therewith and engaging said feed screw, a stationary abutment extending parallel to the said feed screw, rotary means engaging the abutment and movable longitudinally of the same, connections between said worm gear and rotary means comprising bevel gears and means for locking the worm gear against rotation and simultaneously breaking the said connections, substantially as set forth.

3. In a feeding mechanism for phonographs, the combination with the feed screw and movable carriage, of a stud carried by the carriage, a worm gear slidable thereon and engaging said screw, a stationary abutment extending parallel to said screw, rotary means engaging said abutment and mounted on said stud, gear means interposed between said rotary means and worm gear, means for locking said worm gear against rotation and out of connection with said gear means, and means for unlocking said worm gear and moving it into connection with said gear means, substantially as set forth.

4. In a feeding mechanism for phonographs, the combination with the feed screw, abutment, rotary means engaging said abutment and said screw, means supporting the same, means for locking the last named rotary means against rotation, and eccentric means for moving said last named rotary means into engagement with said locking means and out of connection with said first named rotary means or out of engagement with said locking means and into connection with said first named rotary means, substantially as set forth.

5. In a phonograph, the combination of the worm gear 16, bevel gears 18, 19 and 29, feeding means driven by said last named

gear and means for interchangeably locking said worm gear and for coupling the same in driving relation to said train of bevel gears, substantially as set forth.

6. In a phonograph, the combination of the bevel gear 19 mounted on a vertical axis, a bevel gear 18 and worm gear mounted on an axis at right angles to that of said gear 19, and means concentric with the gear 19 for shifting said bevel gear 18 into and out of engagement with the bevel gear 19, substantially as set forth.

7. In a phonograph, the worm gear 16 adapted to engage the feed screw, a bevel gear carried thereby and having a groove 23 and an eccentric stud 22 in engagement with said groove, substantially as set forth.

8. In a phonograph, the combination of a vertical rotatable gear-shifting member 20, a bevel gear 19 mounted thereon, and indicating means applied to said gear-shifting member for designating the rate of feed of the sound box carriage, substantially as set forth.

9. In a phonograph, the combination of the worm gear 16 and rotary feed member 28, means for connecting said worm gear and feed member comprising a bevel gear and a pin concentric therewith, and means whereby a rotary movement of the pin imparts a sliding movement to said worm gear, substantially as set forth.

10. In a phonograph, the combination of the worm gear 16 and rotary feed member 28, means for interchangeably connecting said worm gear and feed member comprising a bevel gear and a pin concentric therewith, means carried by said pin and said worm gear whereby a rotary movement of the pin imparts a sliding movement to said worm gear, and means for locking said pin, substantially as set forth.

11. In a phonograph, the combination of the worm gear 16 and rotary feed member 28, means for interchangeably connecting said worm gear and feed member comprising a bevel gear and a pin concentric therewith, means carried by said pin and said worm gear whereby a rotary movement of the pin imparts a sliding movement to said worm gear, and indicating means applied to said pin for designating the rate of feed of the sound box carriage, substantially as set forth.

This specification signed and witnessed this 13th day of April 1908.

JOHN F. OTT.

Witnesses:

DELOS HOLDEN,

FRANK D. LEWIS.

936,273.

Fig. 1

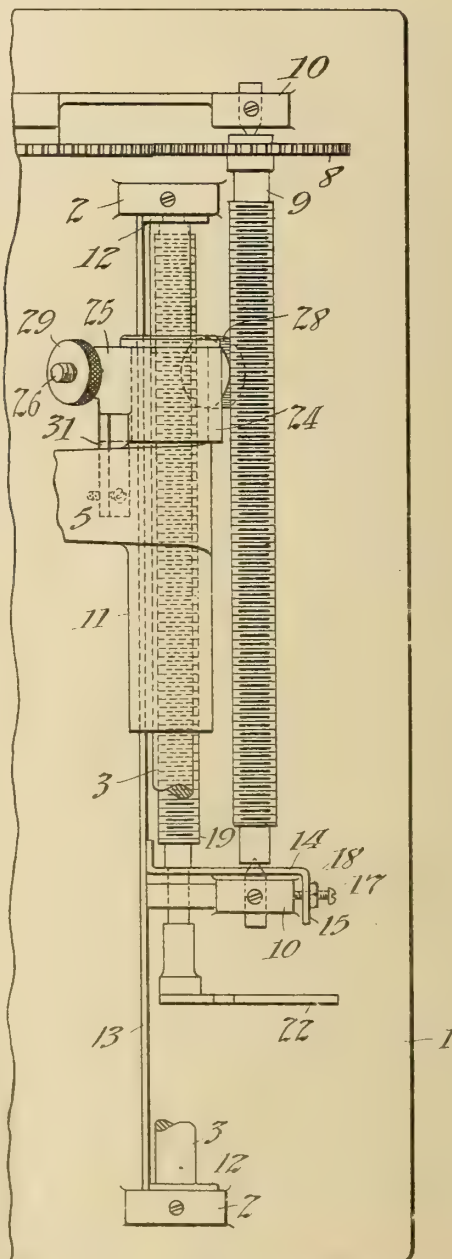


Fig. 4

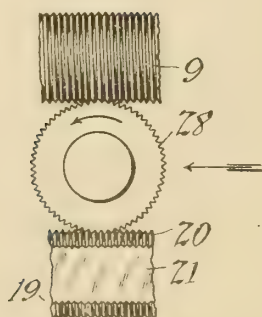
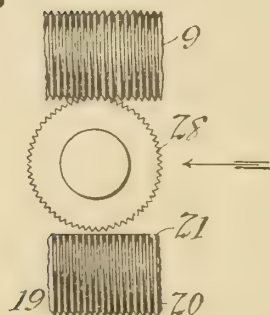


Fig. 5



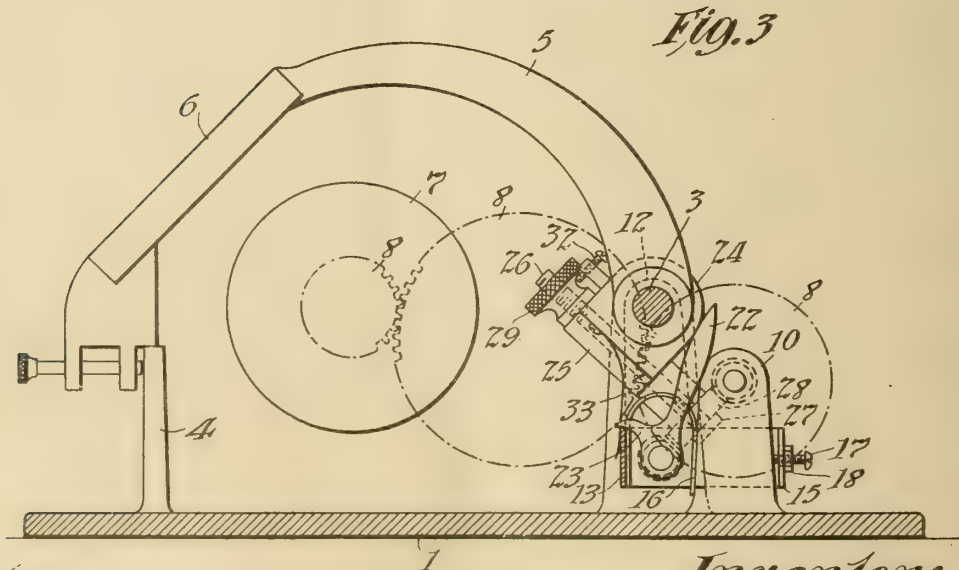
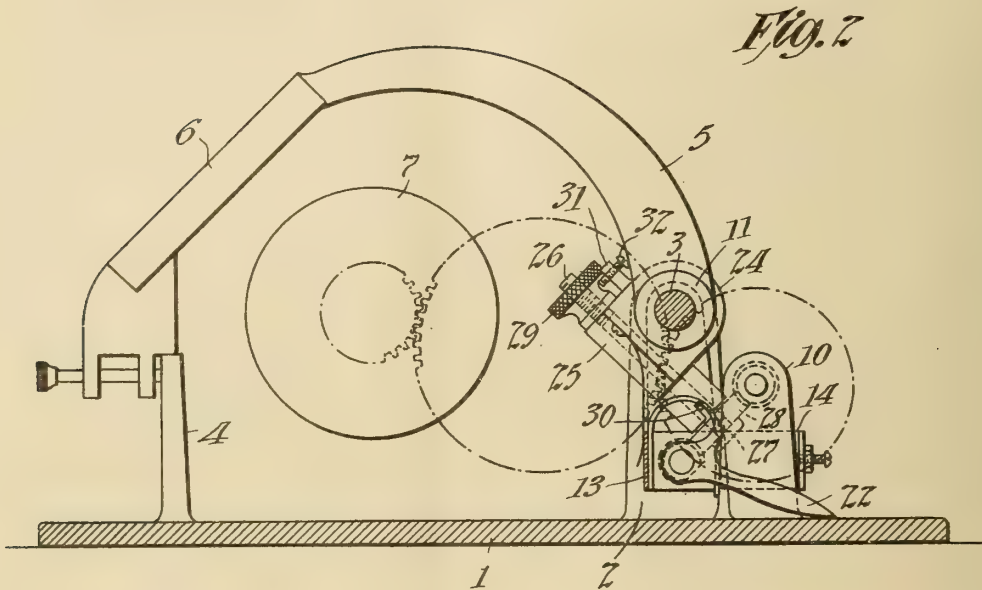
Witnesses:
Frank D. Lewis
H. H. Ryke

Inventor:
John F. Ott
By *Frank L. Green*
Atty.

J. F. OTT.
 FEEDING MECHANISM FOR PHONOGRAPHS.
 APPLICATION FILED JAN. 20, 1908.

936,273.

Patented Oct. 5, 1909.
 2 SHEETS—SHEET 2.



Witnesses:
 Frank D. Lewis
 H. H. Dyke

Inventor:
 John F. Ott
 by Frank L. Brewster
 Atty.

UNITED STATES PATENT OFFICE.

JOHN F. OTT, OF ORANGE, NEW JERSEY, ASSIGNOR TO NEW JERSEY PATENT COMPANY,
OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

FEEDING MECHANISM FOR PHONOGRAPHS.

936,273.

Specification of Letters Patent.

Patented Oct. 5, 1909.

Application filed January 20, 1908. Serial No. 411,831.

To all whom it may concern:

Be it known that I, JOHN F. OTT, a citizen of the United States, and a resident of Orange, county of Essex, and State of New Jersey, have invented certain new and useful Improvements in Feeding Mechanism for Phonographs, of which the following is a description.

My invention relates to various new and useful improvements in phonographs, and particularly to mechanism by which a variable feed may be imparted to the carriage, whereby the instruments may be employed for the reproduction of records, for example, of the present standard pitch of one hundred threads per inch, as well as records of a different pitch, say, two hundred threads per inch.

Broadly considered, the invention relates to feed devices for the purpose of the type disclosed in application of Herman Wolke, filed September 12, 1907, Serial No. 392,480, wherein a traveling nut capable of being locked against rotation engages the ordinary feed screw, whereby the nut when so locked, will be fed in the ordinary way to provide for a movement of the carriage corresponding to the pitch of said screw. When, however, the nut is permitted to rotate and engagement is effected between a part rotated by said nut and a stationary abutment, a differential action takes place and the carriage will be fed at a different speed, the rate thereof depending upon the proportion and ratio of the coöperating elements. The particular feed device shown in said application is illustrated in connection, and was designed for use particularly, with Edison phonographs of the Home type, although obviously not limited to such use.

One of the objects of my present invention is to provide a device for the purpose, which is particularly desirable in connection with phonographs of the Standard type, the mechanism being of such a character that it may be constructed as a separate attachment and applied to existing phonographs by any person of ordinary intelligence and skill.

A further object of the invention is to somewhat simplify the mechanical construction of the device as becomes possible in its application to a phonograph of the Standard type.

In order that the invention may be better understood, attention is directed to the accompanying drawings, forming part of this specification, and in which—

Figure 1 is a plan view of a portion of a Standard phonograph with my present improvements applied thereto; Fig. 2 as cross-sectional view showing the parts in the position which they occupy when a differential feed movement is applied to the carriage, for instance two hundred threads per inch; Fig. 3 a corresponding view showing the parts in position to be fed directly by the feed screw; Fig. 4 an enlarged detail view illustrating the feed screw, worm, and abutment, in position to effect a differential feed; and Fig. 5 a corresponding view showing the same parts in position to effect a direct feed. In all of these views, corresponding parts are represented by the same numerals of reference.

Although, as I have previously said, my improvements have been particularly designed as an attachment to Standard phonographs, it will be of course understood that they may be readily modified so as to apply to phonographs or other talking machines of any desired type having a feed screw and a movable carriage.

The phonograph shown in the drawings is provided with the usual bed plate 1, standards 2—2, carrying the guide rod 3, the straight edge 4, and with the arm 5 sliding on the guide rod 3, and resting at its forward end on the straight edge 4, and formed with an eye 6, in which the recorder or reproducer is mounted. It is also provided with the usual mandrel 7, which carries the record to be reproduced, or blank to be recorded upon; and driven in the ordinary way from the shaft of the mandrel 7 by gears 8—8, is the feed screw 9, mounted in centers between standards 10—10. With the ordinary Standard phonograph a spring arm extends obliquely downward from the sleeve 11, forming the supporting means for the arm 5, and said spring arm carries at its lower end a nut which engages the feed screw 9, but in applying my present improvements to the phonograph this spring arm and nut are removed.

Hung from the guide rod 3, adjacent to the standards 2—2 are arms 12, connected by an integral bar 13. Secured to this bar

is a bracket 14, the outer end of which at 15 extends across the face of one of the standards 10. Interposed between this standard and the bar 13 is a U-spring 16, which tends to swing the bar away from the standard 10, the arms 12 moving pivotally with respect to the guide rod 3. Extending through the arm 15 on the bracket 14, is an adjusting screw 17, engaging the outer face of the bracket of the standard 10, and provided with a lock nut 18, whereby the position of the bar 13 with respect to the standard 10 may be very closely adjusted. Mounted in the bracket 14 in one of the arms 12, and substantially in line below the guide rod 13 is an abutment 19 for the differential feed, said abutment being provided with a rack portion 20, and with a flat cut-away portion 21. Preferably the abutment is formed of a screw threaded shaft with a portion 21 planed off, as will be understood. The abutment 19 may be turned so as to present either the smooth portion 21, or the rack portion 20 to the worm gear (to be presently described) by means of an arm 22 carried on its extremity and provided with a limiting finger 23, which engages the upper edge of the bar 13 (see Fig. 3) when the abutment is moved in one direction. The arm 22 engages the top of the bed plate 1 (see Fig. 2) when the abutment is moved to its limit in the other direction.

Loosely carried upon the sleeve 11 at one side of the arm 5 is a ring 24, formed with a socket 25 at one side. Mounted in this socket is a pin 26, formed with a head 27 at its lower end. Mounted on the pin between the head 27 and the lower end of the socket 25 is a worm wheel 28. When a differential feed is to be imparted to the carriage, the worm wheel 28 rotates freely on the pin 26, and when a direct feed is to be imparted to the carriage the worm wheel is locked from rotation. This latter effect is secured by providing the pin 26 with a thumb nut 29 at its upper end, so that the pin may be forced upward to clamp the worm wheel 28 between the head 27 and the lower end of the socket 25. The pin is prevented from rotating in any suitable way, as for example by an ordinary pin-and-slot arrangement 30.

Extending out from the ring 24 is an arm 31, provided with an adjusting screw 32, the head of which is adapted to be engaged by the arm 5 (see Figs. 2 and 3) when the parts are in operative position for recording and reproducing sounds. This engagement of the arm 5 with the adjusting screw 32 swings the ring 24 on the sleeve 11 and engages the worm wheel 28 with the feed screw 9. When, however, the arm 5 is elevated to move the recorder or reproducer relatively to the blank or record, a small spring 33 carried by the ring 24 and engaging the bar

13 will move the ring in the opposite direction to disengage the worm wheel 28 from the screw 9, and permit the carriage to be moved freely back and forth in the same way as with the ordinary arrangement when the feed nut is withdrawn from the feed screw for the same purpose. When the arm 22 is moved to the position shown in Fig. 3, the abutment 19 will be turned so as to present the flat portion 21 to the worm wheel 28, and there is sufficient clearance between these parts as to permit the worm wheel to be moved as a whole without rotating with respect to the abutment. During this movement, the worm wheel 28 will be clamped against rotation by tightening the thumb nut 29. Obviously, the movement of the carriage imparted in this way will be a direct feed, since the worm wheel 28 will act like the ordinary nut. If, however, the arm 22 is moved to the position shown in Fig. 2, the rack 20 will be engaged with the arm and by loosening the thumb nut 29 to permit the worm to rotate, a differential movement will be imparted to the carriage, due to the rotation of the worm by the feed screw 9, and its engagement with the rack 20, to slowly traverse the same longitudinally. This differential movement may be of any desired rate, depending of course upon the size and ratio of the parts and in the drawings I have illustrated proportions which will impart to the carriage a movement equivalent to a direct feed of two hundred threads per inch.

Having now described my invention, what I claim as new and desire to secure by Letters Patent is as follows:—

1. In a feed mechanism for phonographs, the combination with a movable carriage and a feed screw, of a worm wheel movable with the carriage and engaging the feed screw, and a fixed abutment with which the worm wheel engages and with respect to which it is moved longitudinally by reason of its rotation with the feed screw, substantially as set forth.

2. In a feed mechanism for phonographs, the combination with a movable carriage and a feed screw, of a worm wheel movable with the carriage and engaging the feed screw, and a fixed abutment with which the worm wheel engages and with respect to which it is moved longitudinally by reason of its rotation with the feed screw, means for locking the worm wheel from rotation and means for disengaging the abutment from said worm wheel to permit the worm wheel to be moved bodily by the feed screw, substantially as set forth.

3. In a feed mechanism for phonographs, the combination with a movable carriage and a feed screw, of a worm wheel movable with the carriage and engaging the feed screw, and a fixed abutment with which the

worm wheel engages and with respect to which it is moved longitudinally by reason of its rotation with the feed screw, and means for adjusting the abutment with respect to the worm wheel, substantially as set forth.

4. In a feed mechanism for phonographs, the combination with a movable carriage and a feed screw, of a worm wheel movable with the carriage and engaging the feed screw, and a fixed abutment with which the worm wheel engages and with respect to which it is moved longitudinally by reason of its rotation with the feed screw, and means controlled by the carriage for engaging the worm wheel with the feed screw when the carriage is in its operative position and effecting the disengagement of the worm wheel and feed screw when the carriage is elevated, substantially as set forth.

5. In a feed mechanism for phonographs, the combination with a movable carriage and a feed screw, of a worm wheel connected to the carriage and engaging the feed screw, a rack with which the worm wheel engages and means for moving the rack so as to disengage it from the worm wheel, substantially as set forth.

6. In a feed mechanism for phonographs, the combination with a movable carriage, and a feed screw, of a worm wheel connected to the carriage and engaging the feed screw, a rack with which the worm wheel engages and means for moving the rack

axially so as to disengage it from the worm wheel, substantially as set forth.

7. In a feed mechanism for phonographs, the combination of a movable carriage and a feed screw, of a worm wheel connected to the carriage and engaging the feed screw, and a rack mounted in swinging arms and adjustable toward and away from the worm wheel, substantially as set forth.

8. In a feed mechanism for phonographs, the combination of a movable carriage and a feed screw, of a worm wheel connected with the carriage and engaging the feed screw and a rack mounted in swinging arms and adjustable toward and away from the worm wheel, and means for moving the rack so as to engage it and disengage it from the worm wheel, substantially as set forth.

9. In a feed mechanism for phonographs, the combination of a movable carriage and a feed screw, of a worm wheel connected with the carriage and engaging the feed screw and a rack mounted in swinging arms and adjustable toward and away from the worm wheel, and means for moving the rack axially so as to engage it and disengage it from the worm wheel, substantially as set forth.

This specification signed and witnessed this 13 day of Jan. 1908.

JOHN F. OTT.

Witnesses:

FRANK D. LEWIS,
H. H. DYKE.

H. WOLKE.
FEEDING MECHANISM FOR PHONOGRAPHS.
APPLICATION FILED JAN. 20, 1908.

936,274.

Patented Oct. 5, 1909.

2 SHEETS—SHEET 1.

Fig. 1

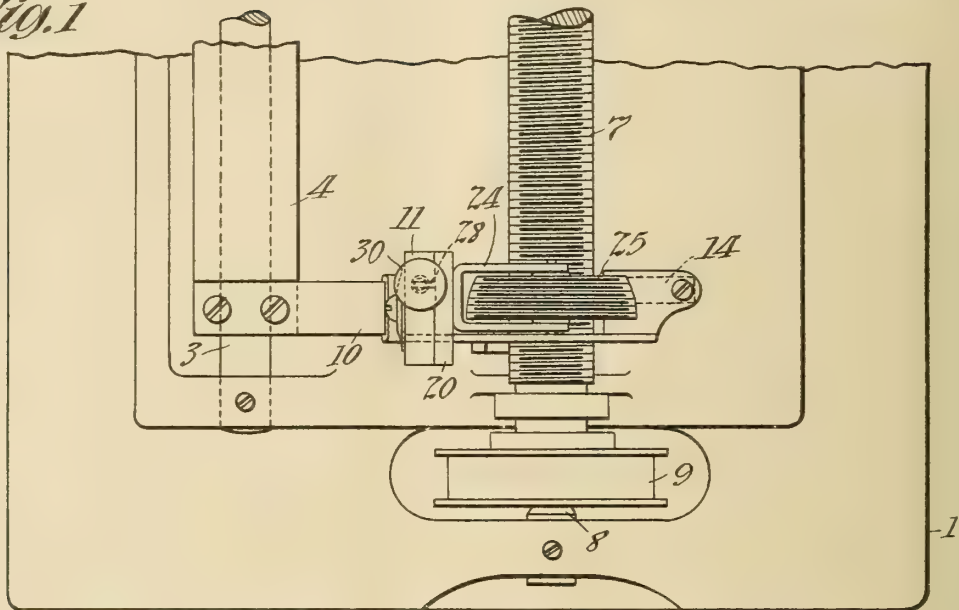
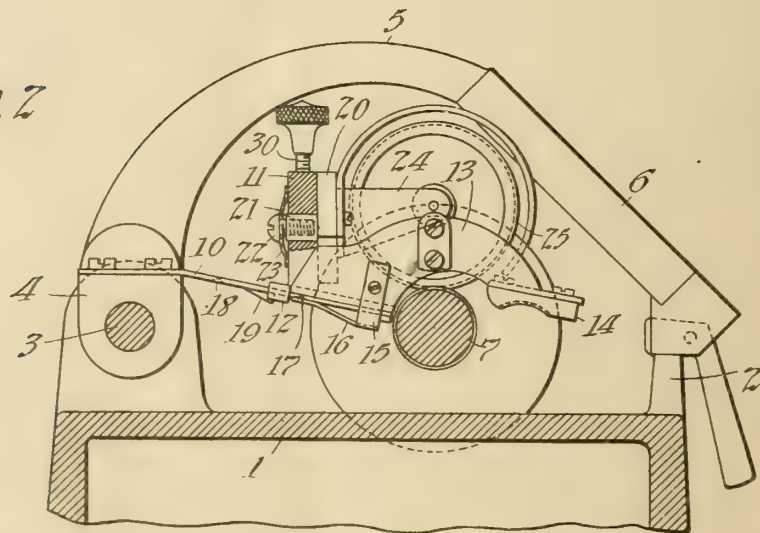


Fig. 2



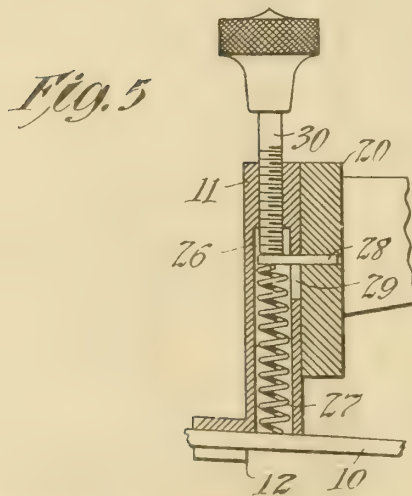
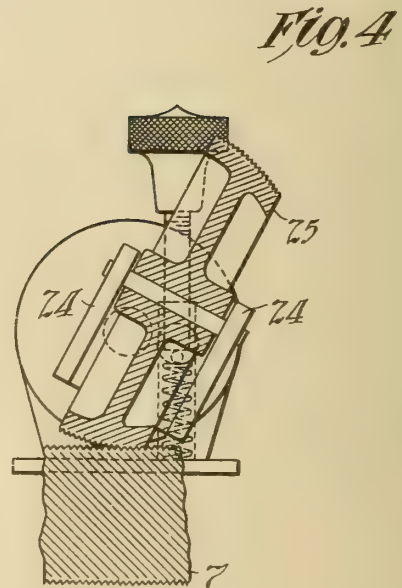
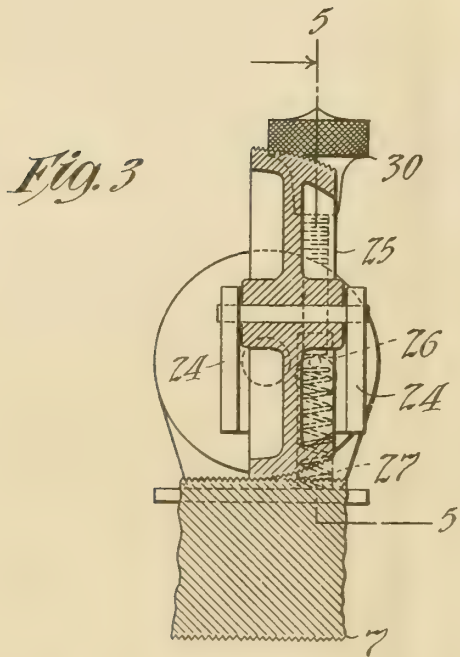
Witnesses:
Frank A. Lewis
H. H. Dyke

Inventor:
Herman Wolke
by Frank L. Dyer
Atty.

H. WOLKE.
FEEDING MECHANISM FOR PHONOGRAPHS.
APPLICATION FILED JAN. 20, 1908.

936,274.

Patented Oct. 5, 1909.
2 SHEETS—SHEET 2.



Witnesses:
Frank D. Lewis
H. H. Dyke

Inventor:
Herman Wolke
by Frank L. Piper
Atty.

UNITED STATES PATENT OFFICE.

HERMAN WOLKE, OF ORANGE, NEW JERSEY, ASSIGNOR TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

FEEDING MECHANISM FOR PHONOGRAPHS.

936,274.

Specification of Letters Patent.

Patented Oct. 5, 1909.

Application filed January 20, 1908. Serial No. 411,837.

To all whom it may concern:

Be it known that I, HERMAN WOLKE, a citizen of the United States, residing at Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Feeding Mechanisms for Phonographs, of which the following is a description.

My invention relates to improvements in feed mechanisms for phonographs of the type disclosed in applications for Letters Patent, filed January 3, 1907, Serial No. 350,648 and Serial No. 350,649, wherein the feed screw of the phonograph or other talking machine is engaged by a rotating threaded nut, whereby the rotation of the nut will effect the feeding movement of the carriage at a slower rate than a direct feed of the screw; provision also being made in the latter application above referred to for disengaging the threaded nut from the feed screw and substituting a fixed nut to permit of a direct feed of the carriage at a higher rate. In the manufacture of phonographs in which very fine feed screws are used, a mistake is sometimes made in the cutting of the thread, in which case the operation is begun over again on a reduced diameter of the stock, from which it results that the diameter of the finished screw is not always uniform. Lack of uniformity in this respect is also due to variations in the diameter of the stock to be operated on, amounting in the extreme to a few thousandths of an inch. Such variation in diameter of the feed screws are not important in a device in which a direct feed is used, because the longitudinal movement effected by the screw will be independent of the diameter thereof, but these variations are of consequence in a device of the type referred to, because with such an arrangement the differential movement depends not only upon the pitch of the screw, but also upon the relative diameter of the screw and the rotating nut.

My present invention provides, and it is my object to provide, an arrangement by means of which variations in the diameters of the feed screws can be properly compensated and in a broad sense the invention consists in effecting this compensation by varying the diameter of the rotating nut. Preferably, this is effected by providing the nut with a convex threaded surface, the maximum and minimum diameters of which

shall be sufficient to include the extreme variations in diameter of the screw encountered in practice, whereby the position of the nut may be adjusted to permit an engagement of its threaded part at the desired diameter to secure the exact feed required. This adjustment of the threaded nut is preferably effected by varying its angle to permit the convex threaded surface thereof to engage the feed screw at the desired point, corresponding to the diameter of the nut.

In order that the invention may be better understood, attention is directed to the accompanying drawings forming part of this specification, and in which—

Figure 1 represents a plan view of a portion of the Home phonograph with my present improvements applied thereto, the guard which partially encircles the threaded nut being removed for the purpose of clearness; Fig. 2 a sectional view of the same with the guard in place; Fig. 3 an enlarged sectional view illustrating the feed screw and rotating nut, with the latter engaging the feed screw on the line of its maximum diameter; Fig. 4 a corresponding view showing the nut engaging the feed screw on the line of its minimum diameter; and Fig. 5 a section on the line 5—5 of Fig. 3.

In all of the above views corresponding parts are represented by the same numerals of reference.

The phonograph is provided with the usual bed plate 1, straight edge 2, guide rod 3, traveling sleeve 4 and arm 5, formed with an eye 6, which receives the recorder or reproducer, the said arm resting at its forward end on the straight edge 2. The feed screw 7 is mounted in the usual way on centers 8, and is driven by a pulley 9, said feed screw carrying the usual mandrel (not shown). Ordinarily, a leaf spring is secured to the sleeve 4, and carries a nut at its forward end, which engages the feed screw so as to feed the carriage at a rate depending upon the pitch of the screw, but with my present attachments, this spring and nut are removed. Secured to the sleeve 4 is a comparatively stiff leaf spring 10, the main portion of which extends substantially diametric to the feed screw and mounted upon this leaf spring is a block 11, provided with fingers 12, which extend around the edges of the spring 10, so as to permit the block to be moved lengthwise of the spring, as will be

understood. Secured to the side of the block 11, is a plate 13, carrying a feed nut 14, at its end. The plate 13 carries a depending finger 15, to which is secured a spring arm 5 16, formed with a small boss 17, adapted to engage the recesses 18, on the underside of the spring 10, so as to lock the parts in either of their extreme positions. A stop 19 limits the rearward movement of the block 11. 10 Mounted on the front face of the block 11 is a plate 20, having a boss 21, which extends through an opening in the block and engaging said boss is a screw 22, between the head of which, and the block 11, a spring washer 15 23, is interposed, whereby the plate 20, will be held firmly in engagement with the face of the block 11. The plate 20 is formed with two arms 24-24, between which is pivoted the rotating nut 25, whose periphery is 20 formed with a thread as shown, of opposite pitch to that of the screw 7. The threaded periphery of the nut 25 is convexed and this convexity is sufficient to include within its varying diameter a sufficient variation to 25 compensate for the usual variations in the diameter of the feed screws 7, so that by adjusting the nut from the position shown in Fig. 3 to that shown in Fig. 4, the proper diameter will be secured for coöperation 30 with the particular screw with which it may be used to give the desired differential feed. This adjustment of the nut is effected by the moving of the plate 20 pivotally on the boss 21. I provide the block 11 with a ver- 35 tical chamber 26 therein, in which is located a spiral spring 27 engaging with a pin 28, carried by the plate 20, and working in a slot 29 formed in the block 11. Engaging above the pin 28 is an adjusting screw 30, 40 which may be moved up and down to adjust the position of the plate 20, as will be understood. Except for this adjustability of the nut the operation of the differential feed is the same as that disclosed in my said ap- 45 plication for patents, the nut being rotated by the feed screw and a longitudinal feeding movement being effected at a lower rate than the pitch of said screw. I contemplate a differential feed equivalent to two hun- 50 dred threads per inch, which will be secured by making the thread on the nut and screw of the same pitch, but of opposite direction, and by making the nut of twice the diameter of the screw. When it is desired to secure 55 a direct feed of the carriage, the block 11 is shifted rearwardly on the spring 10, so as to permit the feed nut 14 to engage the feed screw as with the ordinary arrangement.

Having now described my invention, what 60 I claim as new and desire to secure by Letters Patent is as follows:

1. In differential feed mechanism, the combination with a feed screw, of a ro- 65 tatable nut coöperating therewith and hav-

ing a variable effective diameter, and means

for adjusting the nut to vary the effective diameter thereof, substantially as set forth. 70

2. In differential feed mechanism, the combination with a feed screw, of a nut having a convex surface coöperating with the feed screw, and means for changing the inclination of the nut, so as to vary its effective diameter, substantially as set forth. 75

3. In differential feed mechanism, the combination with a feed screw, of a rotating nut coöperating therewith and presenting a threaded surface of varying diameter, and means for adjusting the position of said nut with reference to the feed screw, substan- 80 tially as set forth.

4. In differential feed mechanism, the combination with a feed screw of a rotatable threaded member adapted to mesh therewith and having varying diameters in parallel planes, and means for holding the same with its axis at varying angles to the axis of the screw, to bring different diameters of the said member into mesh with the said screw, substantially as set forth. 85

5. In differential feed mechanism, the combination with a feed screw of a rotatable threaded member adapted to mesh there- 90 with and having a circular cross section in one plane, and convex surfaces in a plane at right angles thereto, means for mounting the member with the last named plane 95 parallel to the feed screw, and means for adjusting the angular position of said member in said plane, substantially as set forth.

6. In a phonograph, the combination with a traveling carriage and a feed screw, of a rotatable nut connected to the carriage and presenting an operating surface of varying diameter to the feed screw, and means for adjusting the angular position of the nut in a plane parallel to the feed screw, substan- 100 tially as set forth.

7. In a phonograph, the combination with a traveling carriage and a feed screw, of a rotatable nut connected to the carriage pre- 110 senting an operating surface of varying diameter, means for adjusting the position of the nut with respect to the feed screw, a fixed nut also connected to the carriage and means for alternately engaging the rotating 115 and fixed nuts with the feed screw, substantially as set forth.

8. In a phonograph, the combination with a traveling carriage and a feed screw, of a spring connected to the carriage, an adjust- 120 able rotating nut and a fixed nut both movably mounted on said spring, and adapted to alternately engage the feed screw, substantially as set forth.

9. In a phonograph, the combination with a movable carriage, and a feed screw, of a spring connected to the carriage, a sliding block mounted on said spring and movable with respect to the same, and an adjustable rotary nut and a fixed nut carried by said 125 130

block and adapted to alternately engage the feed screws, substantially as set forth.

10. In a phonograph, the combination with a movable carriage and a feed screw, of
5 a spring connected to the carriage, a sliding block mounted on said spring and movable with respect to the same, an adjustable rotary nut and a fixed nut carried by said block and adapted to alternately engage the
10 feed screw, and means for limiting the movement of the block on said spring, substantially as set forth.

11. In a phonograph, the combination with a movable carriage and a feed screw,
15 of a spring connected to the carriage, a block mounted on said spring, a plate secured to the block, but pivotally movable with respect to the same, and a rotating nut mounted on said plate and presenting a

convex threaded engaging surface, substantially as set forth.

12. In a phonograph, the combination with a movable carriage and a feed screw, of a spring connected to the carriage, a
20 block mounted on said spring, a plate secured to the block, but pivotally movable with respect to the same, a rotating nut mounted on said plate, and presenting a
25 convex threaded engaging surface, and an adjusting screw for adjusting the pivotal position of the plate with respect to the
30 block, substantially as set forth.

This specification signed and witnessed this 13 day of Jan. 1908.

HERMAN WOLKE.

Witnesses:

FRANK D. LEWIS,
H. H. DYKE.

J. W. AYLSWORTH.
APPARATUS FOR MAKING DUPLICATE PHONOGRAPH RECORDS.
APPLICATION FILED APR. 4, 1907.

936,275.

Patented Oct. 5, 1909.
4 SHEETS—SHEET 1.

Fig. 1

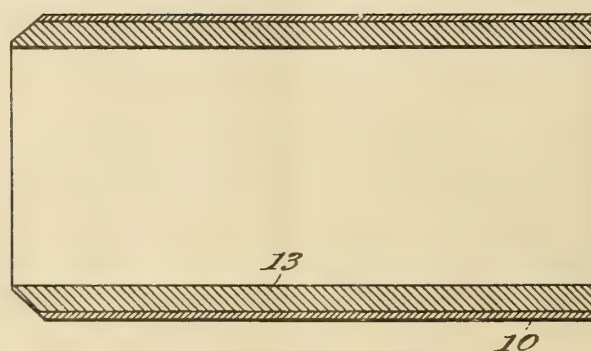


Fig. 2

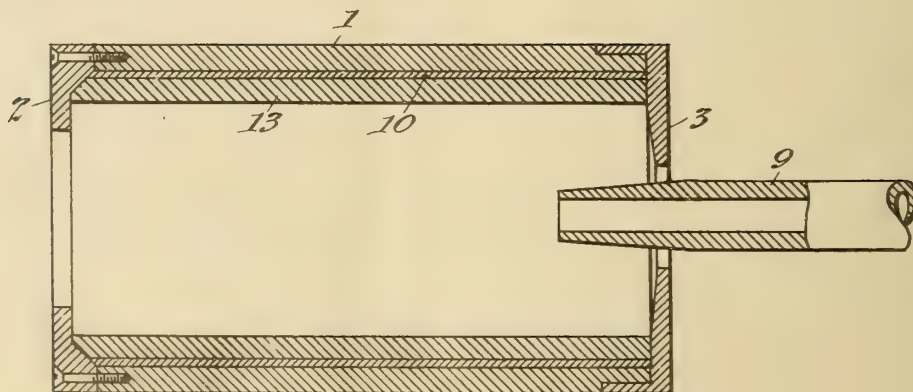
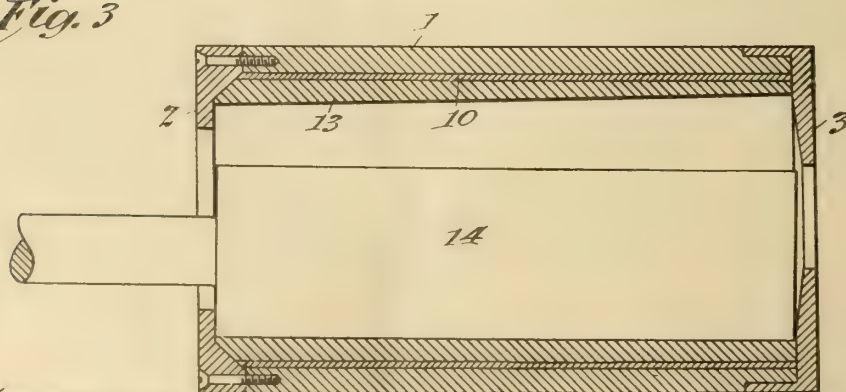


Fig. 3



Witnesses:
Frank D. Lewis
Anna P. Nelson

Inventor:
Jonas W. Aylsworth
by Frank L. Dyer
Atty.

J. W. AYLSWORTH.
 APPARATUS FOR MAKING DUPLICATE PHONOGRAPH RECORDS.
 APPLICATION FILED APR. 4, 1907.

936,275.

Patented Oct. 5, 1909.

4 SHEETS—SHEET 2.

Fig. 4

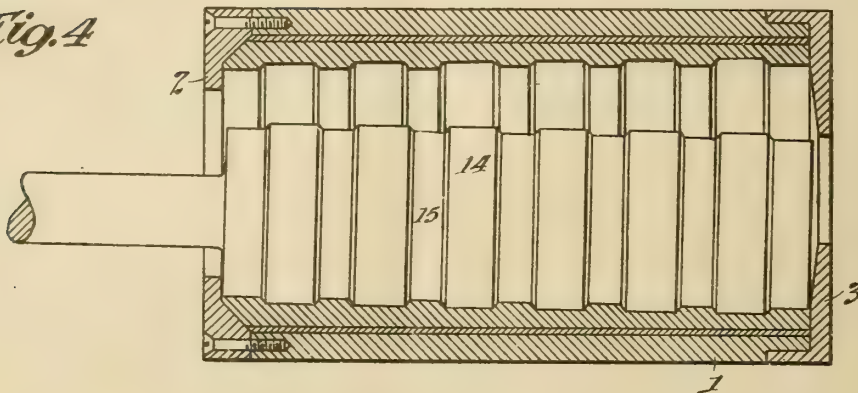


Fig. 5

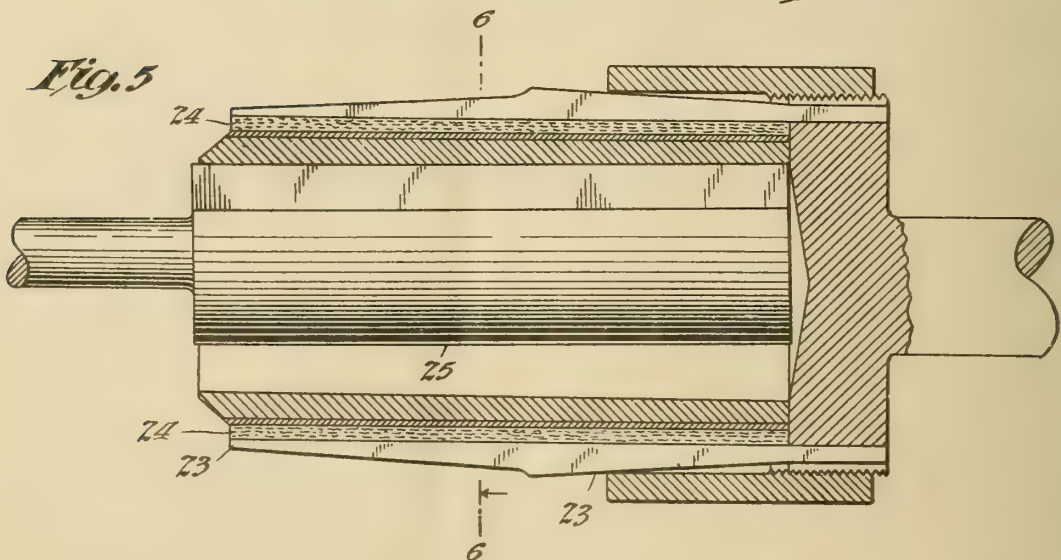
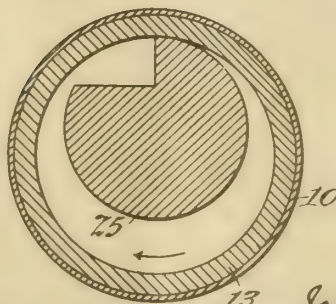


Fig. 6



Witnesses:

Frazer D. Lewis

Anna R. Kelson

Inventor:

Jonas W. Aylsworth

by Frank L. Ryan

Atty.

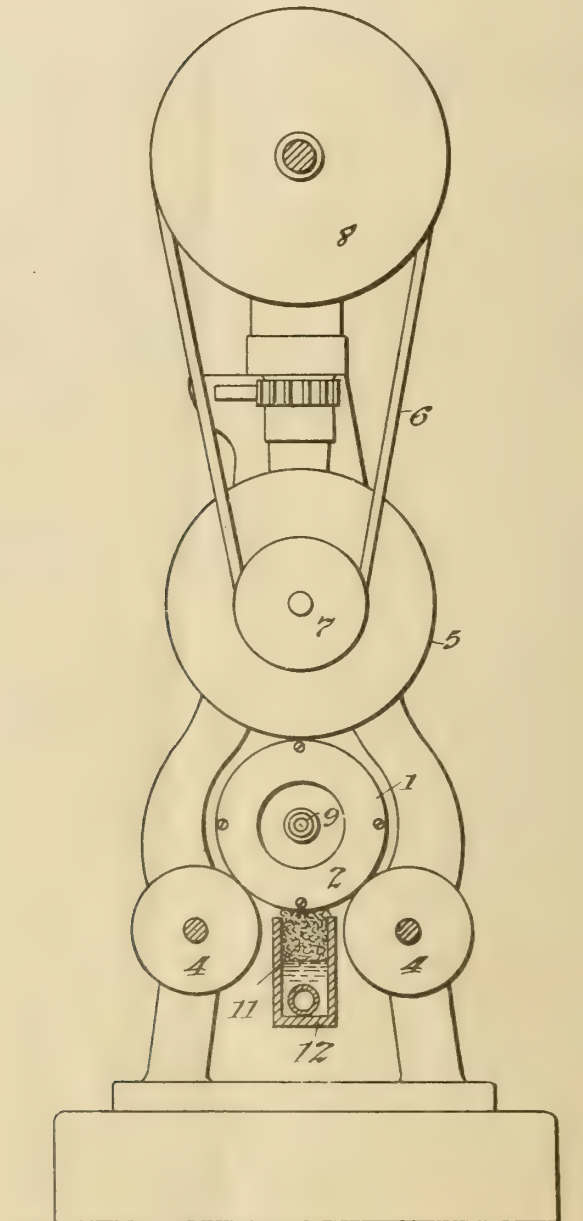
J. W. AYLSWORTH.
APPARATUS FOR MAKING DUPLICATE PHONOGRAPH RECORDS.
APPLICATION FILED APR. 4, 1907.

936,275.

Patented Oct. 5, 1909.

4 SHEETS—SHEET 3.

Fig. 7



Witnesses:

Frank D. Lewis

Samuel P. Nelson

Inventor:

James W. Aylsworth

by Frank L. Dyer

Atty.

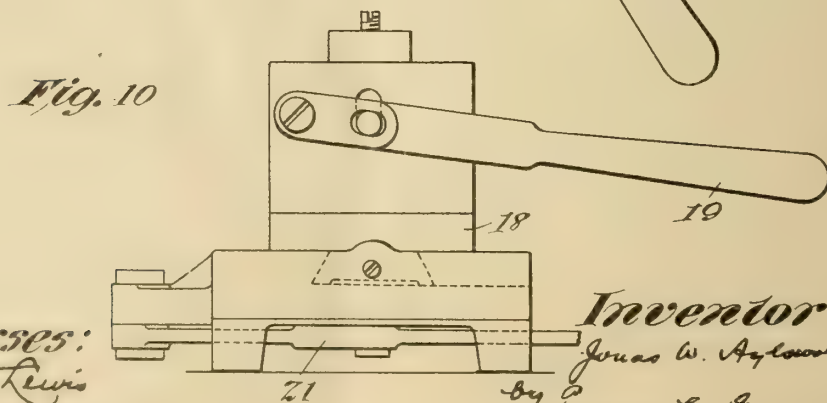
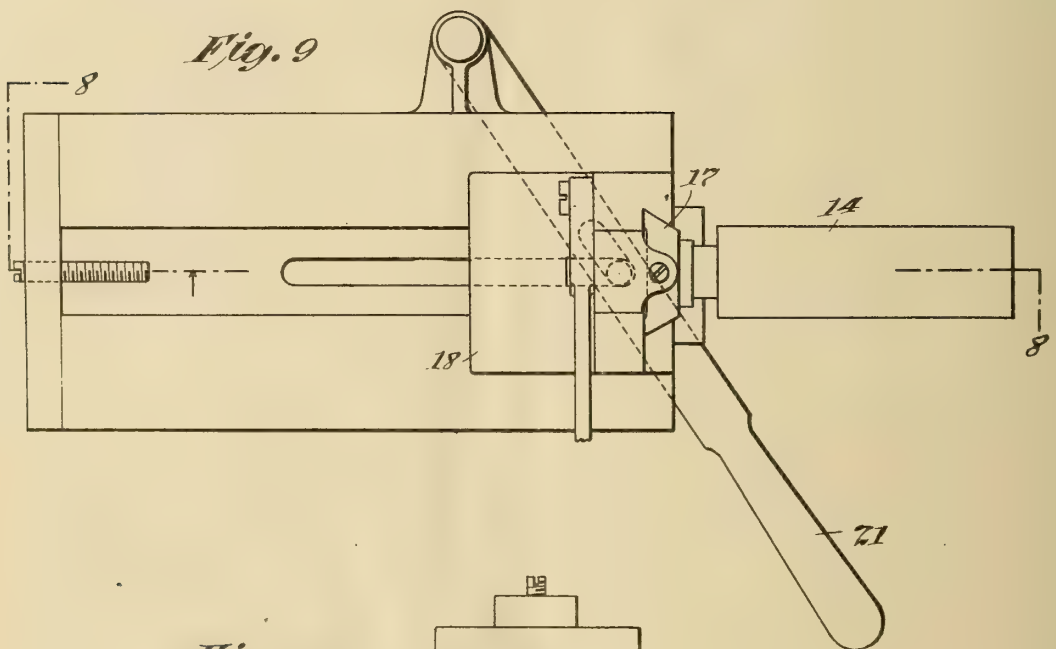
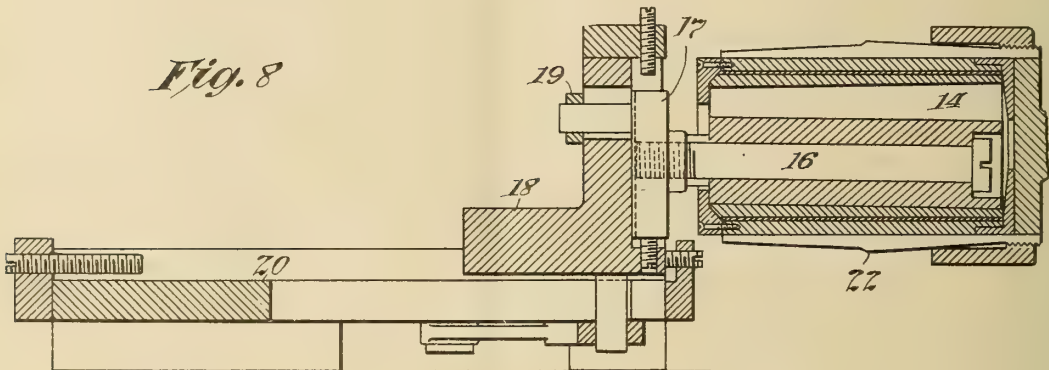


J. W. AYLSWORTH.
 APPARATUS FOR MAKING DUPLICATE PHONOGRAPH RECORDS.
 APPLICATION FILED APR. 4, 1907.

936,275.

Patented Oct. 5, 1909.

4 SHEETS—SHEET 4.



Witnesses:
 Frank D. Lewis
 Samuel P. Ketchum

Inventor:
 Jonas W. Aylsworth
 by Frank L. Lyer
 Atty.

UNITED STATES PATENT OFFICE.

JONAS W. AYLSWORTH, OF EAST ORANGE, NEW JERSEY, ASSIGNOR TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

APPARATUS FOR MAKING DUPLICATE PHONOGRAPH-RECORDS.

936,275.

Specification of Letters Patent.

Patented Oct. 5, 1909.

Original application filed May 31 1906, Serial No. 319,422. Renewed April 23, 1907, Serial No. 369,755.

Divided and this application filed April 4, 1907. Serial No. 366,248.

To all whom it may concern:

Be it known that I, JONAS W. AYLSWORTH, a citizen of the United States, residing at East Orange, county of Essex, and State of New Jersey, have invented certain new and useful Improvements in Apparatus for Making Duplicate Phonograph-Records, of which the following is a description.

This application is a division of application filed May 31, 1906, renewed Apr. 23, 1907, #369,755 which has matured into Patent No. 855,606, granted June 4, 1907.

My invention relates to improved apparatus for the manufacture of duplicate phonograph records being particularly adapted for the production of an improved record which will be claimed in another application but which may be employed for the manufacture of records of other types.

The improved record referred to is a composite cylindrical structure, having an outer layer of a tough, smooth, amorphous material, in which the record surface is formed and from which a smooth and brilliant reproduction can be obtained, and a main body or support therefor composed of a very cheap and tough material unsuitable itself for receiving a record surface, the two layers being welded together so as to constitute practically a single homogeneous structure, as I will more fully hereinafter describe.

The process for which the present invention is particularly adapted is one in which the material in a molten state or in solid or powdered form is introduced into a rapidly rotating mold, as I describe in Patents Nos. 855,553, 855,554 and 855,605, granted June 4, 1907, the outer layer being first formed by the centrifugal force developed and, when the material thereof is sufficiently set but preferably while still slightly plastic, the material to constitute the inner or main layer is introduced so as to be intimately welded to the outer layer. The process also contemplates the carrying on of operations by which the interior of the record may be suitably developed to fit the supporting mandrels of talking machines of the phonograph type, although if an expanding mandrel is employed as disclosed in the patent of Aylsworth and Dyer, dated June 4, 1907, No. 855,604, no separate finishing operation is

necessary, since when the records are removed from the molds after being chilled therein, they will, as an inherent result of the process, be formed with perfectly smooth cylindrical bores.

In order that the invention may be better understood, attention is directed to the accompanying drawings, forming part of this specification, in which—

Figure 1, is a longitudinal sectional view of the improved duplicate phonograph record, Fig. 2, a similar view of the rotating mold, showing the formation of the record thereon, Fig. 3, a similar view illustrating the operation of tapering the bore of the record when desired, while still in a plastic condition within the mold, Fig. 4, a similar view illustrating the operation of forming the record on its bore with a series of concentric ribs. Fig. 5, a similar view, showing the reaming of the record, while cold, to taper its bore. Fig. 6, a section on the line 6—6 of Fig. 5, Fig. 7, an end view partly in section, showing convenient apparatus for rotating and cooling the mold, Fig. 8, a longitudinal sectional view of the apparatus used for finishing the bore of the record, while in a more or less plastic state within the mold, the section being taken on the line 8—8 of Fig. 9, Fig. 9, a plan view of the same with the mold and record removed, and Fig. 10, an end view.

In all of these views corresponding parts are represented by the same numerals of reference.

The mold 1 is of tubular form, carrying on its bore the representation in relief of the record to be duplicated and is produced in any suitable and convenient way, preferably by a process of vacuous deposit, as is well known in the art. This mold is provided with a stationary end flange 2, carrying the usual engraved matter for identifying the record, and with a removable end flange 3, adapted to be secured in place in any suitable way. While the record is being formed in the mold, the latter is rotated so as to cause the material to be uniformly distributed over the record surface by reason of the centrifugal force developed. Any suitable mechanism for this purpose may be used, but in Fig. 7, I illustrate a device of the character described in said

Patent No. 855,605, above referred to and comprising a pair of supporting rollers 1-4 on which the mold is carried, and a rubber faced driving roller 5 for functionally engaging and rotating the mold, said driving roller being rotated by a belt 6 and pulleys 7 and 8. Material may be introduced within the mold in a molten state, the mold being suitably heated so as to prevent the material from congesting thereon, and to permit the material to remain in a perfectly fluid state while it is being distributed over the record surface, as I disclose in my said Patent No. 855,605; or instead, the mold need not be heated provided it is very thin and the material is of sufficient bulk and is heated to a sufficient extent to bring the temperature of the mold up to or above the melting point of the material, as I disclose in my Patent No. 855,604; or instead, material may be introduced within a hot mold in the solid state, preferably in powdered or granular condition, which I disclose in said Patent No. 855,603. In whatever way or condition the material is introduced within the mold, the latter is rotated at the necessary speed to develop sufficient centrifugal force and the material is distributed uniformly over the record surface so as to form a relatively thin layer 10, which during the time of its distribution will be maintained in a fluid condition so as to displace any air or gas bubbles and result in a very perfect impression being taken. This outer or surface layer of the record is now caused to set or harden preferably by rapidly chilling the mold, for instance by a pad 11 carried by a trough 12, to which cooling water is admitted, as I describe in said Patent No. 855,603. When the material of the layer 10 has been thus set, and preferably while still slightly plastic and sticky, the material for the inner layer or body 13 of the record is introduced, the mold being still rotated, whereby the material will distribute itself uniformly over and with respect to the surfacing layer 10, and be intimately welded and associated therewith, so as to form practically a continuous structure. Unless the melting point of the surfacing layer 10 is considerably higher than the melting point of the material comprising the body 13, it will not be practicable to introduce the material for the latter layer in solid form, since it is important that after the surfacing layer has been properly distributed it should retain its solidified condition. Therefore, I introduce a material for the inner layer in the molten state and continue the rotation of the mold until the material has set sufficiently to retain its cylindrical form, the cooling pad 11, or other media being applied to the mold to result in the rapid cooling of the material.

If it is desired that the records should

have a cylindrical bore, the operation will be more complete, and as soon as the record has contracted sufficiently to be removed from the mold, the flange 3 is first removed and the record is lifted out. If, however, it is desired that the record should be formed with a tapered bore either smooth or having a series of concentric ribs, a further finishing operation requires to be performed. This finishing of the record may be effected, while the record is still in a more or less plastic state, although sufficiently hard to retain its shape, by means of a mandrel 14, either smooth, as shown in Fig. 3, or provided with a series of grooves 15, to form concentric ribs on the record (Fig. 4). The mandrel 14 is mounted to rotate easily on a stationary stub shaft 16, maintained at the proper angle to give the desired taper to the bore and carried in a vertically movable slide 17. The slide 17 is mounted in a head 18, and is adapted to be moved vertically by a lever 19. The head 18 slides horizontally on a suitable base 20, being actuated by a lever 21. During the finishing operation, the mold with its more or less plastic contents is carried in a suitable chuck 22, so as to be rotated thereby, and the lever 21 is operated so as to cause the mandrel 14 to enter the mold, after which the lever 19 is moved to depress the mandrel and result in the displacement of the plastic mass, so as to form a bore of the desired taper and shape, the mandrel 14 rotating as the material is displaced, as will be obvious. I find that in this way a tapered bore can be very perfectly formed in a record composed of material which cannot be effectually cut, while in a plastic state and hence while still engaging the mold. Many materials suitable for the formation of at least the interior of duplicate sound records are so viscid and sticky when in a plastic condition that any attempt to cut them in that state would be impossible. However, by displacing the material as described, by means of a rotatable mandrel, I can effectively finish the bores of records composed of extremely viscid material. It is preferable that the mandrel 14 should be kept as cold as possible during the finishing operation, and it may, therefore be chilled before its introduction into the record, or be chilled while within the mold in any suitable way.

In Figs. 5 and 6, I illustrate the finishing of the record on its interior by a cutting operation performed after the record has become cold, and hence after it is freed from the mold. I make use of a chuck 23 of any suitable character, provided preferably with a lining 24 of soft material, such as felt and rubber so as not to scratch the record surface. The record is introduced within the chuck so as to be rotated thereby and a cutting tool 25 engages the bore so as to finish

the same on the desired taper. As I have already indicated, the surfacing layer 10 of the record should be composed of a hard and extremely smooth material, so as to resist wear of the reproducer stylus, and eliminate scratching noises as much as possible. This surfacing layer may be made quite thin, so that a relatively expensive material for the same can be effectively used. An example of a suitable composition from which the surfacing layer may be formed is the special transparent composition described in my Patent No. 616,111, dated June 11th, 1901. A suitable example of material from which the inner or body layer may be formed, and which while being extremely cheap is at the same time tough and of approximately the same coefficient of expansion as the material above referred to, is the following: Asphalt 50 parts, steam pitch 20 parts. In the make up of this composition the ingredients are melted and intimately mixed.

Having now described my invention, what I claim as new and desire to secure by Letters Patent is as follows:

1. Apparatus for finishing the interior of a duplicate phonograph record, comprising means for rotating the record in a semi plastic state, a rotatable mandrel the surface of which is arranged at an angle to the axis of the record, and means for introducing the mandrel within the record and for engaging the same with the bore thereof so as to displace the semi plastic material, substantially as and for the purposes set forth.

2. Apparatus for finishing the interior of duplicate phonograph records, comprising means for rotating the record in a semi plastic state, a rotatable mandrel, whose surface is arranged at an angle to the axis of the record, means for moving the mandrel hori-

zontally for introducing the same within the record, and means for moving the mandrel vertically for engaging the same with the bore of the record to displace some of the material forming the latter, substantially as and for the purposes set forth.

3. Apparatus for finishing the interior of duplicate phonograph record, comprising in combination, means for rotating the record in a semi plastic state, a horizontally movable head, a vertically movable slide carried by the head, and a rotatable mandrel carried by said slide, substantially as and for the purposes set forth.

4. Apparatus for finishing the interior of a duplicate phonograph record, comprising means for rotating the record in a semi plastic state, a member, the surface of which is arranged at an angle to the axis of the record, and means for introducing the mandrel within the record and for engaging the same with the bore thereof so as to displace the semi plastic material, substantially as and for the purposes set forth.

5. Apparatus for finishing the interior of a duplicate phonograph record, comprising means for rotating the record in a semi plastic state, a cylindrical member the axis of which is arranged at an angle to the axis of the record, and means for introducing the mandrel within the record and for engaging the same with the bore thereof so as to displace the semi plastic material, substantially as and for the purposes set forth.

This specification signed and witnessed this 3rd day of April 1907.

JONAS W. AYLSWORTH

Witnesses:

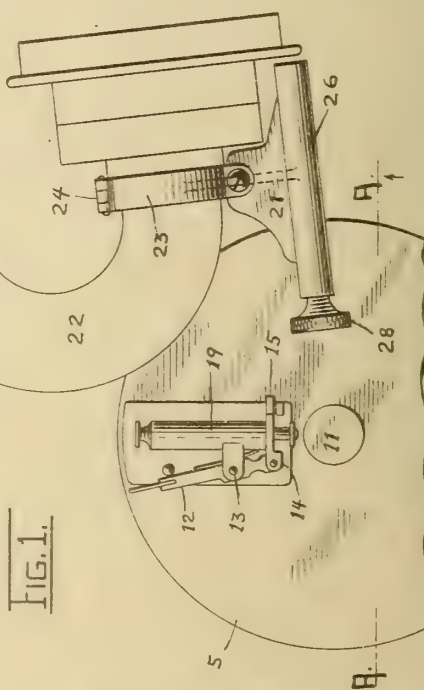
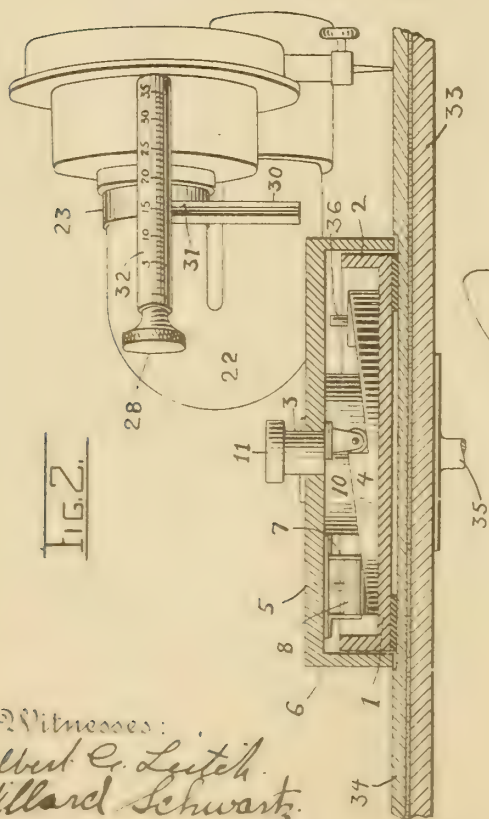
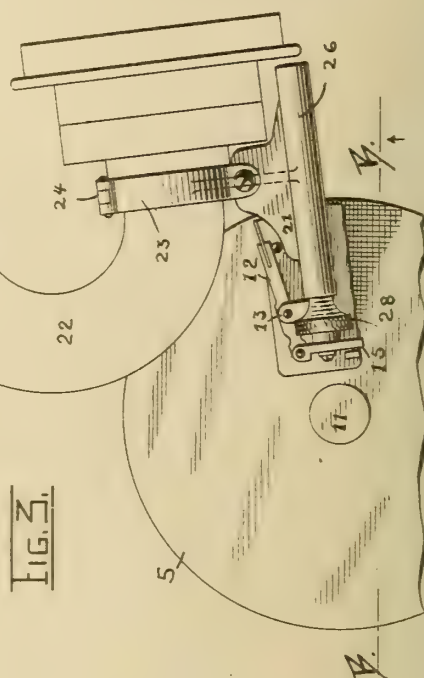
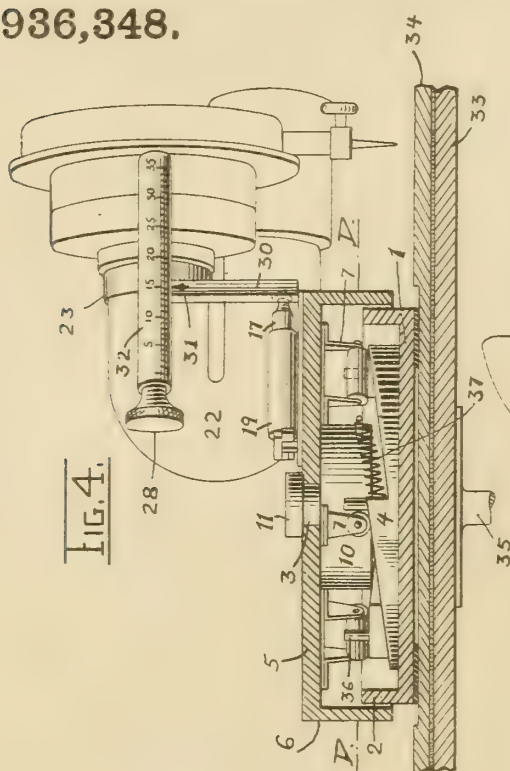
FRANK D. LEWIS,

ANNA R. KLEHM.

G. A. OPPENHEIMER.
 AUTOMATIC NEEDLE DISENGAGING AND STOP MECHANISM FOR SOUND REPRODUCING MACHINES.
 APPLICATION FILED JAN. 29, 1908.

936,348.

Patented Oct. 12, 1909.
 2 SHEETS—SHEET 1.



Witnesses:
 Albert C. Leitch.
 Willard Schwartz.

Inventor
 George A. Oppenheimer
 Attorney
 Hester & Dillenboffer

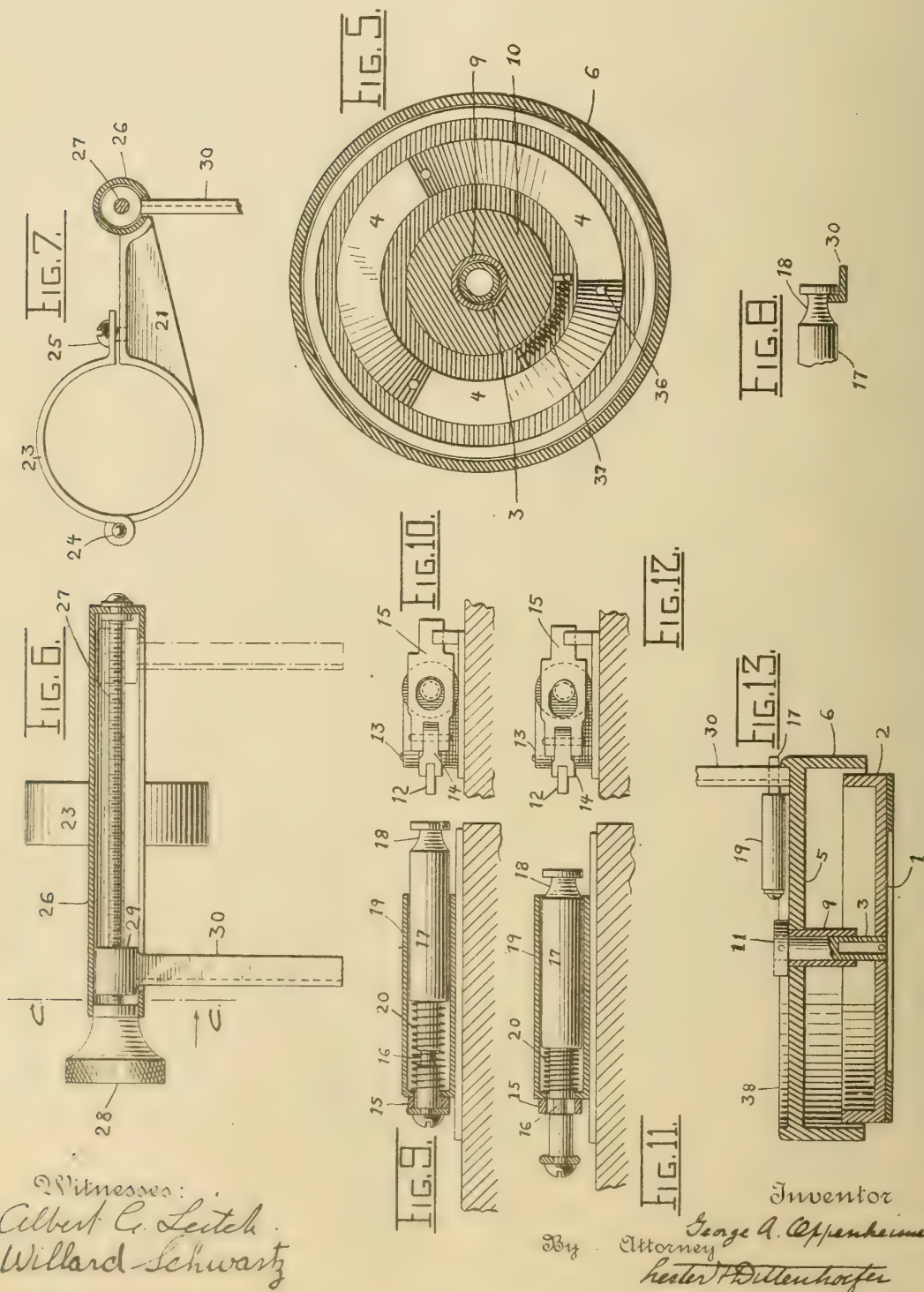


G. A. OPPENHEIMER.
 AUTOMATIC NEEDLE DISENGAGING AND STOP MECHANISM FOR SOUND REPRODUCING MACHINES.
 APPLICATION FILED JAN. 29, 1908.

936,348.

Patented Oct. 12, 1909.

2 SHEETS—SHEET 2.



UNITED STATES PATENT OFFICE.

GEORGE A. OPPENHEIMER, OF NEW ROCHELLE, NEW YORK, ASSIGNOR TO LOUIS H. HAYS, OF CLEVELAND, OHIO.

AUTOMATIC NEEDLE-DISENGAGING AND STOP MECHANISM FOR SOUND-REPRODUCING MACHINES.

936,348.

Specification of Letters Patent.

Patented Oct. 12, 1909.

Application filed January 29, 1908. Serial No. 413,295.

To all whom it may concern:

Be it known that I, GEORGE A. OPPENHEIMER, a citizen of the United States, and residing at New Rochelle, in the county of Westchester, State of New York, have invented certain new and useful Improvements in Automatic Needle-Disengaging and Stop Mechanisms for Sound-Reproducing Machines.

My invention relates to attachments for sound reproducing machines having revolvable horizontal tables upon which are placed the disk records.

The object of my invention is to provide a mechanical device which will automatically disengage and lift the reproducer needle or stylus from the face of the record and stop the rotation of the record upon the completion of the reproduction of the matter inscribed upon the record, or at some other predetermined point in the rotation of the said record.

The accompanying drawings illustrate my invention, in which similar characters of reference indicate corresponding parts throughout the several views.

Figure 1 is a plan view of the engaging mechanism in position prior to engaging and lifting the reproducer needle. Fig. 2 is a side elevation of the attachment having a section of the casing removed along the line A A in Fig. 1, and showing a perspective view of the internal mechanism. Fig. 3 shows a plan view of the device in position of engagement with the projecting arm. Fig. 4 is a side elevation of the attachment in position corresponding to Fig. 3, having a section of the casing removed along the line B B, and showing a perspective view of the internal mechanism. Fig. 5 is a section through the line D D in Fig. 4. Fig. 6 is a detailed view in elevation of the bracket and projecting arm. Fig. 7 is a section in elevation through the line C C in Fig. 6. Fig. 8 is a detailed sectional view showing the end of the stop bolt engaging the projecting arm. Fig. 9 shows a detailed view of the stop bolt released. Fig. 10 is a detailed rear elevation of the part shown in Fig. 9. Fig. 11 shows a detailed view of the stop bolt restrained. Fig. 12 is a rear eleva-

tion of the part shown in Fig. 11. Fig. 13 is a sectional elevation through the center of the casing, and shows a modified form of the top portion thereof.

The bottom plate (1), having an upwardly projecting rim (2) and a centrally located upright sleeve (3), carries upon its face the inclined surfaces or abutments (4). The top plate (5), having a downwardly projecting rim (6) and carrying the downwardly hanging supports (7) in which are journaled the ends of the rollers (8), is loosely mounted upon the upright sleeve (3). A bushing (9) is provided to steady the top plate and to prevent it from binding the sleeve. The bottom and top plates, with their respective rims, form a casing which serves to protect and conceal the internal mechanism. This portion of the device must be of sufficient weight to allow it to properly adhere to the face of the record so as to be carried and revolved by it. When the casing of the attachment is made of metal or other suitable material, no extra weight is needed, but when the casing is made of some lighter material, as for instance, rubber or wood, a weight (10) surrounding the bushing (9) and fastened to the top plate (5) may be provided. A collar (11) is fastened by means of a rivet or other suitable fastening to the top of the sleeve (3) so as to prevent the two portions of the casing from being pulled apart.

The engaging mechanism, which is suitably fastened to the upper surface of the top plate (5), consists of a trigger (12) pivoted in the support (13) and attached at the inner end through the connecting link (14) to the latch (15). The latch is adapted to engage a recess (16) in the stop bolt (17). The stop bolt has a notched head (18) and is suitably housed in the frame (19). A spring (20), one end of which bears against the bolt and the other end against the housing is provided to spring the bolt in position when the latch is released through the movement of the trigger, as is shown in Figs. 9 to 12.

The bracket (21) is fastened to the arm (22) that carries the reproducer or sound-box of the phonograph. For this purpose the bracket is supplied at the fastening end

thereof, with a band (23) hinged at (24) and adapted to be clamped by means of a thumb screw or other suitable fastening (25). The outer end of the bracket carries a hollow horizontally disposed barrel (26), in the ends of which is suitably journaled a set screw (27), having a knurled head (28). A nut (29), adapted to be moved in a horizontal direction by means of the screw (27), carries the downwardly projecting arm (30). The arm 30 carries a pointer (31) which indicates the movement of the same upon the graduations (32) placed upon the outside of the barrel (26).

15 The manner in which my invention operates is as follows: Upon the revoluble horizontal table (33) of the sound reproducing machine, is placed the record (34). Over the central position of the record, in such manner that the sleeve (3) fits over the spindle (35) of the phonograph, I place my attachment. The attachment will then be in the position shown in Fig. 2, that is, with the rollers, carried by the top plate, bearing on the bottom part of the inclined surfaces or abutments. The projecting arm (30) is first set so as to engage the stop bolt at the proper point, which is preferably at the completion of the tune carried on the record. The needle or stylus of the reproducer is then placed upon the record and the mechanism of the phonograph started. As the needle reaches the predetermined point, the projecting arm (30) will engage the trigger, the free end of which projects slightly beyond the head of the stop bolt, causing the stop bolt to be released and snapped in position, so that upon the next revolution of the record the notched head of the stop bolt is presented to and engages with the web of the projecting arm (30), thereby preventing the top part of the attachment from further rotation. The bottom plate, carrying the inclined surfaces or abutments, now rotates independently of the top plate which is held in engagement with the projecting arm (30), thereby causing the roller supports of the top plate to mount the inclined surfaces or abutments and vertically raise said top plate. The lower end of the projecting arm rests upon the upper surface of the top plate and is raised with it, thereby disengaging and lifting the needle from the face of the record, as shown in Fig. 4. The ascending motion of the rollers is arrested by the pins (36) suitably fastened in the top of the inclined surfaces. The attachment being suitably weighted and being rigidly held by the reproducer arm of the phonograph, through the projection (30), acts as a friction brake against further rotation of the record and causes it to come to rest.

65 A band or strip of felt, rubber, or other suitable adhesive material may be applied to the bottom surface of the attachment so as to provide a good friction bearing between the attachment and the record.

When the projection (30) is lifted from the attachment and the record removed, the spring (37), the ends of which are suitably fastened to the upper and lower parts of the attachment respectively, brings the parts of the attachment back to their normal position as shown in Fig. 2. This spring may be omitted and the upper part will fall back into its original position by reason of its weight.

The modified form of the casing shown in Fig. 13, has a raised lip (38) formed around the periphery of the upper surface of the top plate, which acts as a safeguard to prevent the end of the projecting arm 30 from breaking away from engagement with the stop bolt.

The construction and arrangement of the various parts may be modified and varied from that illustrated in the accompanying drawings without departing from the essential features of this invention.

90 What I claim as my invention, and desire to secure by Letters Patent is:

1. A brake attachment for talking machines, comprising a member adapted to rest on the record and to engage the sound-box or corresponding part of the machine, as such part approaches the center of the record, whereby further rotation of the latter is stopped.
2. A brake attachment for talking machines, comprising a member adapted to loosely rest on the record, said member having a friction surface for engaging with said record and being adapted to engage the sound-box or corresponding part of the machine, as such part approaches the center of the record; whereby further rotation of the latter is stopped.
3. A brake attachment for talking machines, comprising a member adapted to rest on the record, and movable means borne by said member and adapted in one position thereon to engage the sound-box or corresponding part of said machine, as such part approaches the center of the record.
4. A brake attachment for talking machines, comprising a member adapted to loosely rest on the record, said member having a friction surface for engaging with said record, and means borne by said member and adapted to engage the sound-box or corresponding part of said machine, as such part approaches the center of the record.
5. A brake attachment for talking machines, comprising a member adapted to loosely rest on the record, said member having a friction surface for engaging with said record, and radially movable means borne by said member and adapted in extended position to engage the sound-box or correspond-

ing part of said machine, as such part approaches the center of the record.

6. A brake attachment for talking machines, comprising a member adapted to rest on the record, and a stop bolt reciprocally mounted on said member and adapted, when extended, to engage the sound-box or corresponding part of said machine, as such part approaches the center of the record.

7. A brake attachment for talking machines, comprising a member adapted to rest on the record, a stop bolt reciprocally mounted on said member and adapted, when extended, to engage the sound-box or corresponding part of said machine as such part approaches the center of the record, resilient means tending thus to extend said bolt, and a latch normally retaining the same in its inner position, said latch being operable by engagement with such machine part to release said bolt.

8. A brake attachment for talking machines, comprising a member adapted to rest on the record, a stop bolt reciprocally mounted on said member and adapted, when extended, to engage the sound-box or corresponding part of said machine as such part approaches the center of the record, resilient means tending thus to extend said bolt, and a pivotal latch normally retaining the same in its inner position, said latch being operable by engagement with such machine part to release said bolt.

9. In a talking machine, the combination with the record and sound-box or corresponding part of the machine coöperative with said record, of a member resting on said record, and a projection carried by such machine part and adapted to engage said member to stop the further rotation of the record.

10. In a talking machine, the combination with the record and sound-box or corresponding part of the machine coöperative with said record, of a member resting on said record, and a projection carried by such machine part and adapted to engage said member to stop the further rotation of the record, said member and projection being adjustable relatively to each other independently of the movement of the latter with such machine part.

11. In a talking machine, the combination with the record and sound-box or corresponding part of the machine coöperative with said record, of a member resting on said record, and a projection carried by such machine part and adjustable in the direction of movement of the same, said projection being adapted to engage said member to stop the further rotation of the record.

12. In a talking machine, the combination with the record and sound box or corresponding part of the machine coöperative with said record, of a member resting on said record, a bracket carried by said ma-

chine part and projecting in the direction of movement of the same, and an arm adjustable along said bracket and adapted to engage said member to stop the further rotation of the record.

13. In a talking machine, the combination with the record and sound-box or corresponding part of the machine coöperative with said record, of a member resting on said record, a bracket carried by said machine part and carrying a barrel projecting in the direction of movement of such part, a screw within said barrel, and a nut mounted on said screw so as to be adjustable along said barrel, said nut being provided with a downwardly projecting arm adapted to engage said member to stop the further rotation of the record.

14. A brake attachment for talking machines, comprising two relatively movable members adapted to rest on the record, movement of the one member upon the other serving to raise the same from the record, and said movable member being adapted to engage the sound-box or corresponding part of said machine, as such part approaches the center of the record.

15. A brake attachment for talking machines, comprising two relatively movable members adapted to rest on the record, movement of the one member upon the other serving to raise the same from the record, and movable means borne by said last-named member and adapted in one position thereon to engage the sound-box or corresponding part of said machine, as such part approaches the center of the record.

16. A brake attachment for talking machines, comprising two relatively movable members adapted to rest on the record, movement of the one member upon the other serving to raise the same from the record, and radially movable means borne by said last-named member and adapted in one position thereon to engage the sound-box or corresponding part of said machine, as such part approaches the center of the record.

17. In an attachment for sound reproducing machines, the combination with the rotative record, of a device provided with an inclined surface arranged to be rotated therewith, a member movable upon the inclined surface, and a projection carried by the reproducer arm and adapted to engage said member so as to stop the further rotation of the record and raise the reproducer therefrom, substantially as described.

18. In an attachment for sound reproducing machines, the combination with the rotative record, of a device provided with an inclined surface arranged to be rotated therewith, a member movable upon the inclined surface and adapted to be carried therewith, and a projection carried by the reproducer arm and adapted to engage said member so

as to stop the further rotation of the record, and raise the reproducer therefrom, substantially as described.

19. In an attachment for sound reproducing machines, the combination with the rotative record, of a device provided with an inclined surface arranged to be rotated therewith, a stop bolt movable upon the inclined surface and adapted to be carried therewith, and a projection carried by the reproducer arm and adapted to engage said bolt so as to stop the further rotation of the record and raise the reproducer, substantially as described.

20. In an attachment for sound reproducing machines, the combination with the rotative record, of a device provided with an inclined surface arranged to be rotated therewith, a bolt movable upon such inclined surface and adapted to be carried therewith, means for controlling the thrust of the stop bolt, and a projection adapted to be carried by the reproducer arm and arranged to engage said bolt so as to stop the further rotation of the record, and raise the reproducer therefrom, substantially as described.

21. An attachment for sound reproducing machines, comprising a member having an inclined surface, a second member movably mounted on the inclined surface, and a projection adapted to be carried by the reproducer arm and arranged to engage and restrain said second member, substantially as described.

22. An attachment for sound reproducing machines, comprising a member having

an inclined surface, a plate movably mounted on the inclined surface, a bolt mounted upon said plate, means including a latch for controlling the thrust of the bolt, and a projection carried by the reproducer arm and arranged to engage said bolt so as to restrain further rotation of the plate, and cause the same to mount the inclined surface, substantially as described.

23. An attachment for sound reproducing machines, comprising a lower plate adapted to be carried by the record and formed with an inclined surface, an upper plate movable upon such inclined surface, a bolt mounted upon the upper plate, means including a latch for controlling the thrust of said bolt, and a projection adapted to be carried by the reproducer arm arranged to act upon the latch and engage the bolt so as to restrain the further rotation of the upper plate and cause it to mount the inclined surface, thereby lifting the reproducer from the record, substantially as described.

24. In an attachment for sound reproducing machines, the combination of a bracket adapted to be fastened to the reproducer arm and carrying at one end a barrel, a screw within said barrel, and a nut mounted upon said screw so as to be adjustable along said barrel, said nut having a downwardly projecting arm, substantially as described.

GEORGE A. OPPENHEIMER.

Witnesses:

LESTER L. DITTENHOEFER,
GERTRUDE K. BRENNAN.

H. R. STUART.
TELEGRAPHONE.
APPLICATION FILED MAR. 21, 1908.

936,490.

Patented Oct. 12, 1909.

Fig. 1.

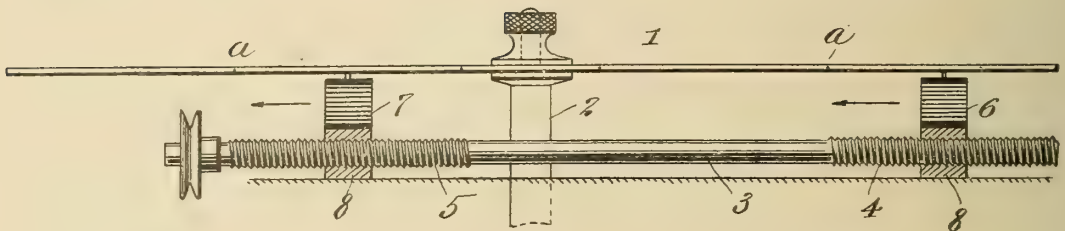


Fig. 3.

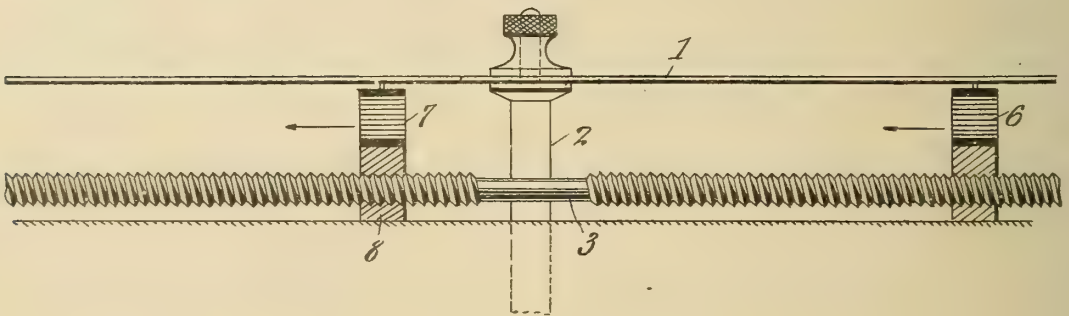


Fig. 2.

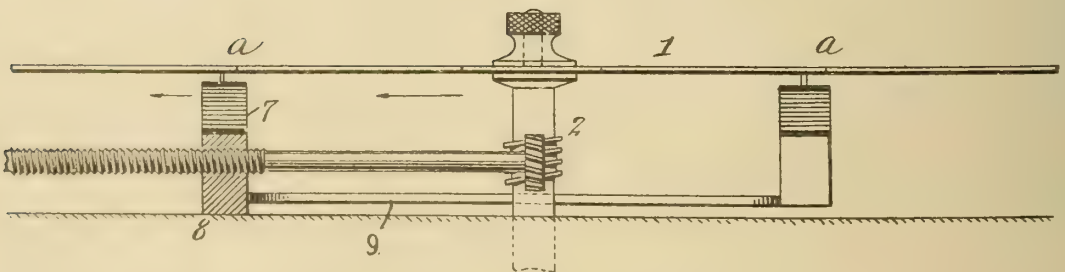
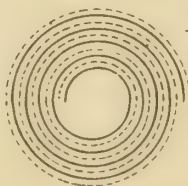


Fig. 4.



Witnesses:
H. S. Obue.
Waldo M. Chopin

Inventor
H. R. Stuart
By his Attorneys
Rosenbaum & Lockridge

UNITED STATES PATENT OFFICE.

HARVE R. STUART, OF WHEELING, WEST VIRGINIA, ASSIGNOR TO AMERICAN TELEGRAPHPHONE COMPANY, A CORPORATION OF THE DISTRICT OF COLUMBIA.

TELEGRAPHPHONE.

936,490.

Specification of Letters Patent.

Patented Oct. 12, 1909.

Application filed March 21, 1908. Serial No. 422,399.

To all whom it may concern:

Be it known that I, HARVE R. STUART, a citizen of the United States, residing at Wheeling, in the county of Ohio and State of West Virginia, have invented certain new and useful Improvements in Telegraphphones, of which the following is a full, clear, and exact description.

This invention relates to telegraphphones of that class in which the recording steel body is in the form of a disk. In this kind of machine, it is well known that if the disk runs at a uniform speed, the record will be weaker as it approaches the center of the disk, on account of the peripheral speed with respect to the magnet growing less as the diameter decreases. Speed governors are not always desirable, and sometimes cannot be relied upon for accurate graduation of speed as the magnet shifts its position. Consequently, two magnets, one moving from the periphery toward the center and the other from the center toward the periphery, and both connected in the same circuit, have been used to obtain uniform strength of record and reproduction thereof. This arrangement also gives a louder reproduction, since the sum of the effect of the two magnets is obtained. In using two magnets in this manner heretofore, one magnet has been arranged to act upon one face of the disk, while the other has been arranged to act upon the opposite face, both magnets being fed radially the entire distance from the periphery to the hub. Under some conditions, however, it is not convenient or feasible to operate a magnet on each side of the disk.

My invention therefore consists, broadly, in locating the two magnets both on the same side of the disk, leaving the other side free. In this arrangement, each magnet can act upon only one-half of the recording surface, so that the capacity is reduced in that proportion, but for some purposes this is not material, and when the reduced capacity is not material, the advantage of a clear space on the opposite side of the disk is gained.

My invention is illustrated in the accompanying drawing, in which,

Figure 1 is a side elevation of a conventional form of my invention in which the two magnets are located on opposite sides of the center of the disk. Fig. 2 is a similar view of a form of the invention in which two

magnets are mounted on a single frame which is fed by a single screw. Fig. 3 is a similar view in which the two magnets are located on opposite sides of the center of the disk, but travel the entire distance across the recording surface, the spiral path traced by one alternating with that traced by the other; and Fig. 4 illustrates the path of the two magnets when arranged as in Fig. 4.

Referring to the drawings, 1 indicates the recording body in the form of a disk, it being mounted upon a central rotating shaft 2. Arranged parallel to one face of the disk is a feed screw 2 to be rotated in any suitable manner from the motor of the machine. As shown in Fig. 1, this feed screw extends across but to one side of the axis of the disk and on each side of the axis is provided with a screw thread 4 and 5 respectively, the thread at one end being opposite the outer half of the recording space, that is, the recording space that extends from the periphery of the disk to the point *a* half way to the hub, while the thread at the other end of the screw is opposite the inner half of the recording surface which lies between the point *a* and the hub. The recording magnets indicated by 6 and 7 are mounted upon suitable carriers which are provided with a nut or threaded portion 8 and engage the respective threaded portions 4 and 5 of the feed screw. The magnets are so placed upon their respective threads that when one of them is at the extreme outer position, the other is at the extreme inner position of the respective recording surfaces. When the machine is in motion, the magnets uniformly shift their relative positions, both of them traveling in the same direction, as indicated by the arrows. The record produced and reproduced by the magnet 6 will always be stronger than that produced and reproduced by the magnet 7, because it acts upon a portion of the disk which is moving at a higher speed than that portion of the disk which is acted upon by the magnet 7. But, at all times, since the magnets are connected in the same circuit, the record produced and reproduced by the magnet 6 will be augmented by that produced and reproduced by the magnet 7. Since the magnets change their radial positions uniformly, one growing weaker while the other grows stronger, the sum of the record produced and repro-

duced will, at all times, be constant. It will be seen, however, that by this arrangement, each magnet acts upon only one-half of the recording surface, so that the capacity of the disk on that surface is reduced to one half.

In the arrangement shown in Fig. 2, the capacity of the disk remains the same as in the arrangement of Fig. 1, and the strength of the record produced and reproduced is also the same, but the two magnets are here mounted upon a single frame 9 which requires a single nut 8 and a single feed screw.

In Fig. 3, the two magnets are located upon opposite sides of the center of the disk, but each travels the full radial width of the recording surface. In order to prevent one of these magnets from tracing the same spiral path on the disk which is traced by the other, and thereby causing interference of the two magnetic records, the pitch of the threads on the feeding screw are made coarser, or the pitch and width of the record path made less, and one magnet is so placed upon the screw that it will trace a spiral line, the turns of which will alternate with those of the spiral line traced by the other magnet, as clearly illustrated in Fig. 4, wherein the full line indicates the path of one magnet, and the dotted line the path of the other. With this arrangement, the capacity of the disk is the same as in the

other structures and the production and reproduction of the record remains the same. 35

What I claim, is:

1. In a telegraphone, the combination of a recording body in the form of a disk, two telegraphone magnets located upon the same side of the disk, and means for moving one of the magnets from a point on the disk running at high speed to a point at lower speed and for moving the other magnet simultaneously and uniformly therewith from a point on the disk running at low speed to one running at a higher speed, substantially as described. 40 45

2. In a telegraphone, the combination of a recording body in the form of a disk, two telegraphone magnets located on the same side of the disk, said magnets being located upon opposite sides of the center of the disk and feeding mechanism for moving said magnets simultaneously in a substantially radial direction, one magnet from a position on the disk of high speed toward a position of low speed, and the other from a position on the disk of low speed to one of higher speed. 50 55

In witness whereof, I subscribe my signature, in the presence of two witnesses. 60

HARVE R. STUART.

Witnesses:

FRANK S. OBUR,
WALDO M. CHAPIN.

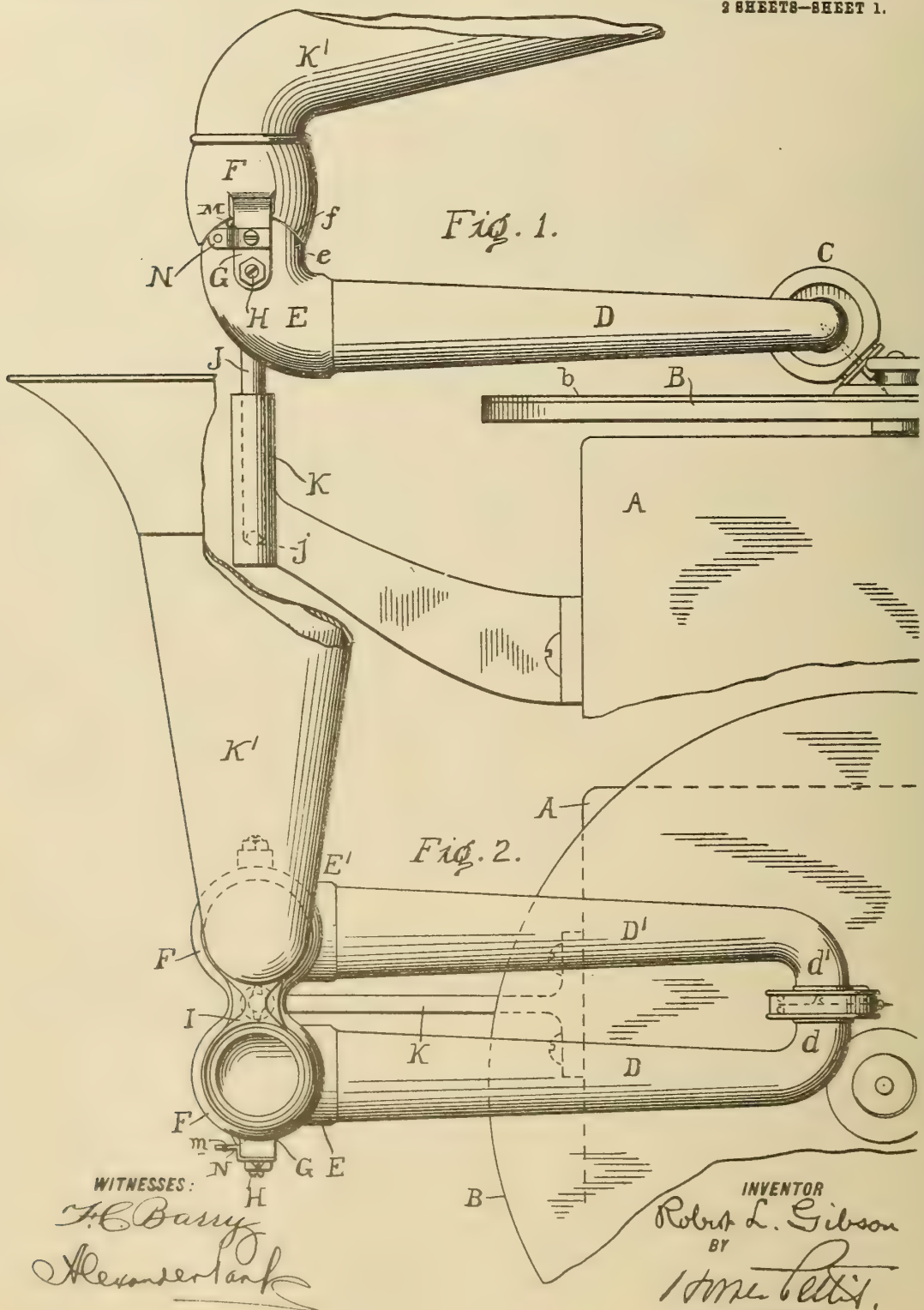
R. L. GIBSON.
TALKING MACHINE.

APPLICATION FILED DEC. 11, 1905. RENEWED FEB. 24, 1909.

936,531.

Patented Oct. 12, 1909.

2 SHEETS—SHEET 1.



WITNESSES:
A. Barry
Alexander

INVENTOR
Robert L. Gibson
BY
Wm. L. Gibson
ATTORNEY.

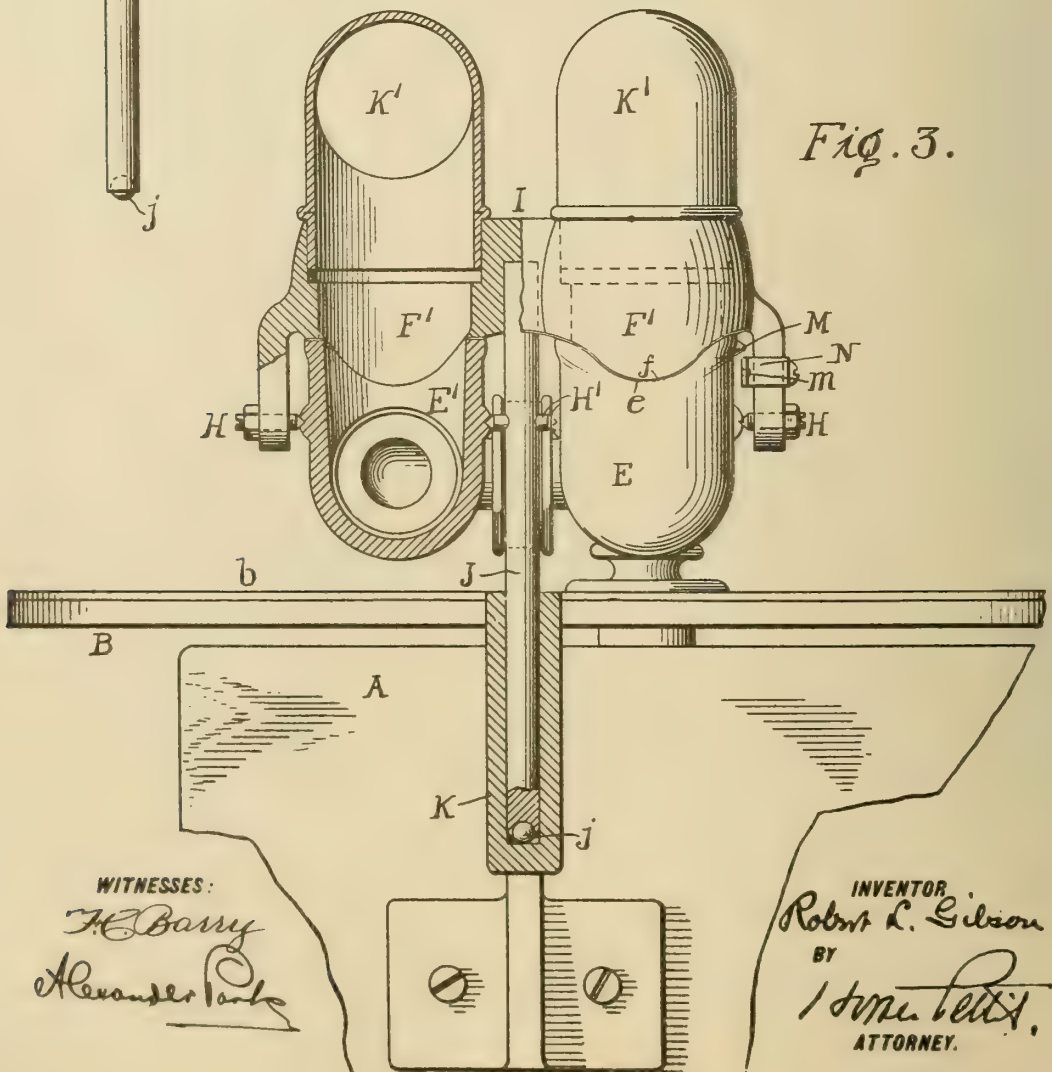
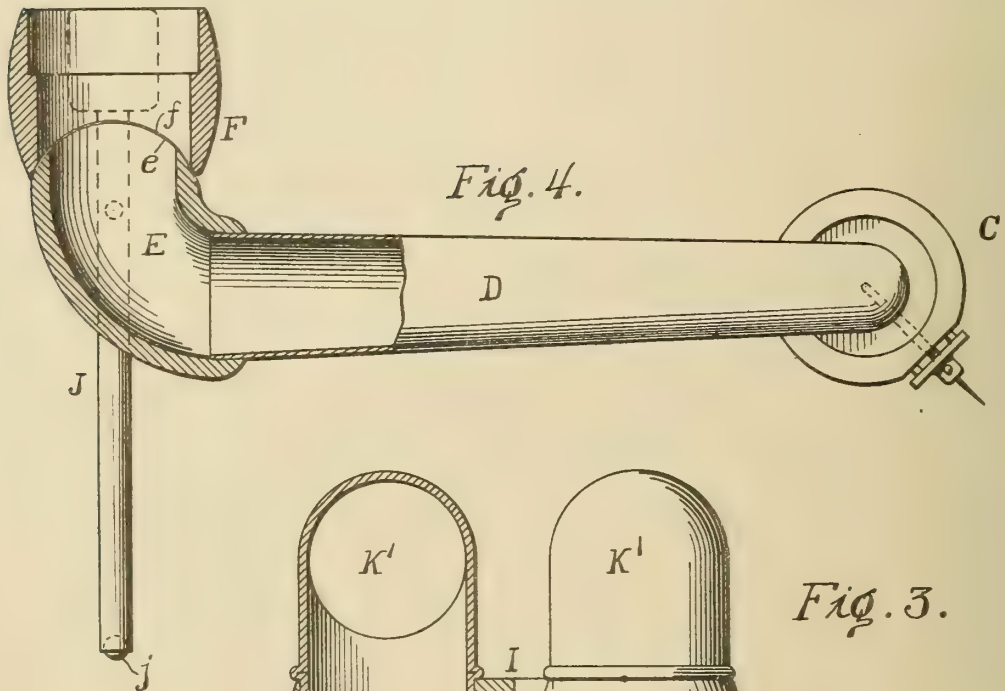
R. L. GIBSON.
TALKING MACHINE.

APPLICATION FILED DEC. 11, 1905. RENEWED FEB. 24, 1909.

936,531.

Patented Oct. 12, 1909.

2 SHEETS—SHEET 2.



WITNESSES:

H. Barry
Alexander Park

INVENTOR

Robert L. Gibson

BY

John Peltz

ATTORNEY.

UNITED STATES PATENT OFFICE.

ROBERT L. GIBSON, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW JERSEY.

TALKING-MACHINE.

936,531.

Specification of Letters Patent.

Patented Oct. 12, 1909.

Application filed December 11, 1905, Serial No. 291,196. Renewed February 24, 1909. Serial No. 479,844.

To all whom it may concern:

Be it known that I, ROBERT L. GIBSON, a citizen of the United States, and a resident of the city of Philadelphia, State of Pennsylvania, have invented certain new and useful Improvements in Talking-Machines, of which the following is a full, clear, and complete disclosure.

My invention has reference to talking machines and consists of certain improvements which are fully set forth in the following specification and shown in the accompanying drawings, which form a part thereof.

The object of my invention is to provide a construction of sound reproducing devices so arranged that the air upon each side of the diaphragm of the sound box shall be confined and delivered to independent horns through the media of jointed tubular arms adapted to swing vertically about pivots in the same transverse alinement and to swing horizontally upon a common vertical axis whereby the weight of the horns is removed from the record disk.

The specific objects of such invention eliminate the "scraping" or "grinding" noises of the stylus in the record groove which are apparent in instruments in which the diaphragm is exposed on one side, and secondly to increase the volume of sound given off from a given record disk, and to project said sound in any direction desired, irrespective of the position of the tubular jointed arms and sound box.

In carrying out my invention, I provide a head having two tubular parts and pivoted upon a bracket with provision for moving about an upright axis, and combine therewith two horns fitted respectively to the upper ends of the tubular parts and preferably with provision for independent adjustment, and two tubular arms pivoted to the head and respectively making a jointed or hinged connection with the lower edges of the tubular parts of the head and having their free ends secured toward each other and respectively opening into air chambers upon opposite sides of the diaphragm of the sound box.

My invention also comprehends various details of construction which, together with the above specified features, will be better

understood by reference to the accompanying drawings, in which:

Figure 1 is a side elevation of a talking machine embodying my invention (with portions broken away); Fig. 2 is a plan view of same; Fig. 3 is a rear elevation with part in section; and Fig. 4 is a sectional elevation of the head and hinged tubular arms carrying the sound box.

A is the motor and case and B is the revolving disk carrying table upon which the record disk *b* is placed.

C is the sound box and may be of any ordinary construction but with both sides of the diaphragm inclosed to form air chambers and respectively connected, by oppositely directed tubular necks *d d'*, with two pivoted tubular arms D D'. These tubular arms are preferably somewhat tapering and the largest ends are secured to elbows E E' which open upward and form jointed connections with tubular parts F F' constituting a head I. This head is provided with a downwardly extending shaft J rotatably supported in a bracket K secured to and extending from the box or case A. To reduce the friction of the shaft J in the bracket, I prefer to provide the lower end of the shaft with an anti-friction ball *f* which is fitted into a recess in the end as shown.

The elbows E E' of the tubular arms are pivoted on transverse axes by means of pivots H H', the axes of oscillation of these two arms being in alinement so that the two tubular arms are free to oscillate vertically at their free ends about the said axes H H' while the arms, together with the head I, are free to rotate about the vertical axis formed by the shaft J. The connection between the parts E E' and F F' is clearly shown in Figs. 3 and 4, and consists of the convex surface *e* of the elbows E E' fitting into the concave surface *f* of the tubular parts F F', the juncture of these two surfaces *e f* being very close so that, while not creating any material friction, they prevent the escape of the air vibrations. The curvature of these faces is cylindrical and made from the axes of the pivots H H' as a center.

K K' are two horns which are adjustably supported by the upper ends of the tubular

parts F F' of the head I. The horns are preferably independently adjustable so that they may be turned in any direction desired, even to pointing in opposite directions, in which case their weight will be balanced upon opposite sides of the pivot J.

N is a spring catch secured to the head I and having a recessed portion *m* into which a lug M on the side of the arm E is adapted to be received, when the sound box is raised. In this manner the arms D D' may be supported in an elevated position during the changing of the records.

From the foregoing construction it will be seen that the sound box and its tubular arms are free to rise and fall and may receive vibrations without being affected by the weight of the horns and consequently, the excess of downward pressure upon the stylus point is entirely obviated. By the structure here shown, the pressure upon the stylus is at all times uniform and consequently, accurate reproductions are secured with a minimum wear upon the stylus point and record disk.

While I prefer the construction shown as an excellent example of the embodiment of my invention, I do not limit myself to the minor details thereof, as these may be modified in various ways without departing from the spirit of my invention.

Having now described my invention, what I claim as new and desire to secure by Letters Patent, is:—

1. In a talking machine, a head having two tubular parts and free to revolve upon a vertical axis, combined with two tubular arms respectively having their free ends directed toward each other and their opposite ends hinged to the head adjacent to the tubular portions thereof upon transverse axes so that the free ends of said tubular arms are free to rise or fall, and a sound box secured between the oppositely directed free ends of the tubular arms.

2. In a talking machine, a head having two tubular parts and free to revolve upon a vertical axis, combined with two tubular arms respectively having their free ends directed toward each other and their opposite ends hinged to the head adjacent to the tubular portions thereof upon transverse axes so that the free ends of said tubular arms are free to rise and fall, a sound box secured between the oppositely directed free ends of the tubular arms, and independent horns secured to the head and respectively opening into the tubular portions thereof.

3. In a talking machine, a head having two tubular parts and free to revolve upon a vertical axis, combined with two tubular arms respectively having their free ends directed toward each other and their opposite ends hinged to the head adjacent to the tubular portions thereof upon transverse axes so

that the free ends of said tubular arms are free to rise or fall, a sound box secured between the oppositely directed free ends of the tubular arms, and independent horns secured to the head and respectively opening into the tubular portions thereof, with provision for independent adjustment upon said head whereby each of the horns may be pointed in a variety of different positions.

4. In a talking machine, a head having two tubular parts and free to revolve upon a vertical axis, combined with two tubular arms respectively having their free ends directed toward each other and their opposite ends hinged to the head adjacent to the tubular portions thereof upon transverse axes so that the free ends of said tubular arms are free to rise or fall, a sound box secured between the oppositely directed free ends of the tubular arms, and means for locking the pivoted arms to the head when the free ends of said arms and sound box are elevated.

5. In a talking machine, a head I having two vertical tubular portions F F' and supported upon and rotatable about a vertical axis and in which the lower faces of the tubular parts F F' are made with concave cylindrical surfaces, in combination with horns secured to the upper portions of the tubular parts of the head, and two tubular arms D D' having their free ends directed toward each other and secured to the sound box and their opposite ends formed with vertically directed elbows E E' having convex cylindrical surfaces adapted to the concave cylindrical surfaces of the tubular portions F F' of the head, and pivots for said elbow portions of the tubular arms for permitting the said arms to oscillate vertically at their ends connected with the sound box.

6. In a talking machine, the combination of a head rotatable about a vertical axis and having a tubular portion provided with a concave cylindrical surface, a horn supported upon the head and opening into the tubular part, and a pivoted tubular arm having its free end connected with the sound box and its opposite end provided with a convex cylindrical portion corresponding in curvature to the concave cylindrical surface of the head, pivots for the tubular arm for suspending said arm from said head and for permitting it to rotate upon a transverse axis while holding it in close adjustment with the head so as to constitute an arm joint between the said head and tubular arm, whereby a minimum amount of friction is created between the arm and head.

7. In a talking machine, the combination of a head rotatable about a vertical axis and having a tubular portion provided with a concave cylindrical surface, a horn supported upon the head and opening into the tubular part, and a pivoted arm having its free end connected with the sound box and

its opposite end provided with a convex cylindrical portion corresponding in curvature to the concave cylindrical surface of the head, pivots for the tubular arm for suspending said arm from said head and for permitting it to rotate upon a transverse axis while holding it in close adjustment with the head so as to constitute an arm joint between the said head and tubular arm, whereby a minimum amount of friction is created between the arm and head, and means for locking the arm in an elevated position upon the head when its free end is abnormally raised.

8. In a talking machine, the combination of a head pivotally mounted upon a shaft at one side thereof, said head having a curved cylindrical under surface, a pivot upon said shaft, a pivot carried by said head opposite said first mentioned pivot, and a sound conveying arm carried by said pivots and having an upper convex surface corresponding in curvature to and engaging against the concave surface of said head so as to constitute an arm joint between the said head and tubular arm, whereby a minimum amount of friction is created between the arm and the head.

9. A duplex horn mounting comprising a head having a solid central portion and two vertical tubular portions, a vertical shaft connected to said solid portion and rotatably carrying said head, an arm depending from said head upon each side of said shaft, pivots carried by said arms, pivots carried by said shaft in alinement with said first mentioned pivots, sound arms supported by said pivots and flexible joints between said head and said tubular arms.

10. A duplex horn mounting comprising a head having a solid central portion and two vertical tubular portions having concave cylindrical under surfaces, a vertical shaft connected to said solid portion and rotatably carrying said head, two arms depending from said head, pivots carried by said arms, pivots carried by said shaft in alinement with said first mentioned pivots, and sound arms supported by said pivots and having convex cylindrical ends corresponding in curvature to the concave cylindrical surfaces of the head, whereby a minimum amount of friction is created between the arms and the head.

11. In a talking machine, a head having two tubular parts and free to revolve upon an axis combined with a pair of tubular arms respectively, having their free ends directed toward each other, and their opposite ends hinged to said head adjacent the tubular portions thereof upon transverse axes,

and a sound box secured between the free ends of said tubular arms.

12. In a talking machine, a head having two tubular parts and free to revolve upon an axis combined with two tubular arms respectively, having their free ends directed toward each other, their opposite ends hinged to said head adjacent the tubular portions thereof on transverse axes, a sound box secured between the free ends of said tubular arm and independent horns secured to the head and respectively opening into the tubular portions thereof.

13. In a talking machine, a head having two tubular parts and free to revolve upon an axis, and a sound box secured between the free ends of said tubular arms, the opposite ends of said arms being hinged to said head adjacent the tubular portion thereof upon transverse axes.

14. In a talking machine, the combination of a head, a shaft upon which said head is pivotally mounted, said head having a cylindrical under surface, a pivot upon said shaft, a pivot carried by said head opposite said first mentioned pivot, and a sound conveying arm carried by said pivots and having an upper surface engaging against said cylindrical surface of said head to constitute a joint between said head and tubular arm.

15. In a talking machine, the combination of a head, a shaft upon which said head is pivotally mounted at one side thereof, a pivot upon said shaft, a pivot carried by said head opposite said first mentioned pivot, and a sound conveying arm carried by said pivots.

16. A duplex horn mounting comprising a head having two tubular portions, a shaft connected to said head and rotatably carrying said head, an arm depending from said head upon each side of said shaft, pivots carried by said arms, pivots carried by said shaft in alinement with said first mentioned pivots, and sound arms supported on said pivots.

17. A duplex horn mounting comprising a head having two tubular portions, a shaft connected to said head and rotatably carrying same, a pair of sound arms pivoted to said head and communicating respectively with said tubular portions, and a sound box mounted between the free ends of said arm and communicating therewith.

In witness whereof, I have hereunto set my hand this twenty-eighth day of November, A. D. 1905.

ROBERT L. GIBSON.

Witnesses:

ERNEST HOWARD HUNTER.

R. M. KELLY.

L. H. HAYS.
ATTACHMENT FOR PHONOGRAPHS.
APPLICATION FILED JULY 8, 1908.

936,534.

Patented Oct. 12, 1909.

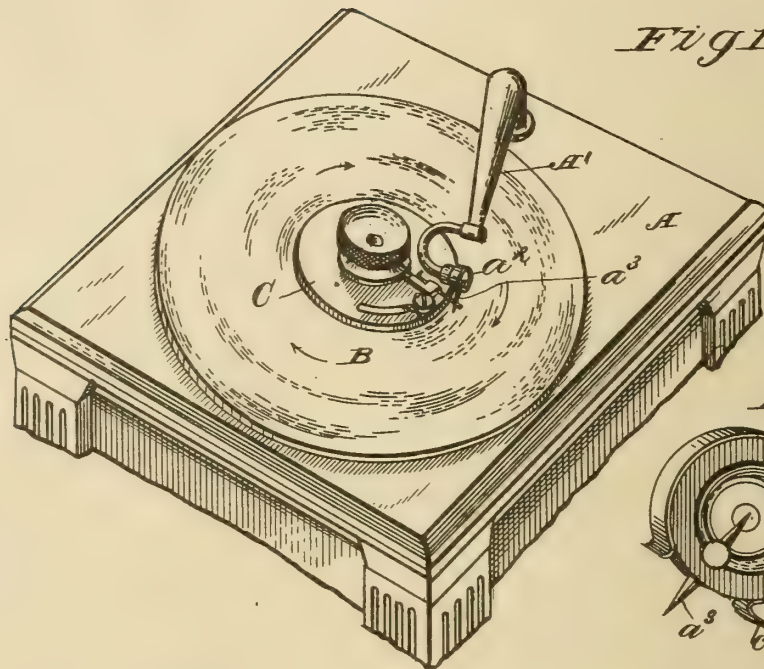


Fig. 1

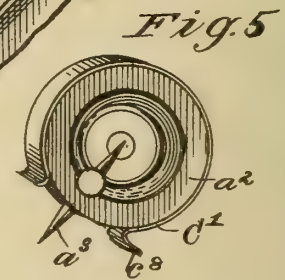


Fig. 5

Fig. 2

Fig. 3

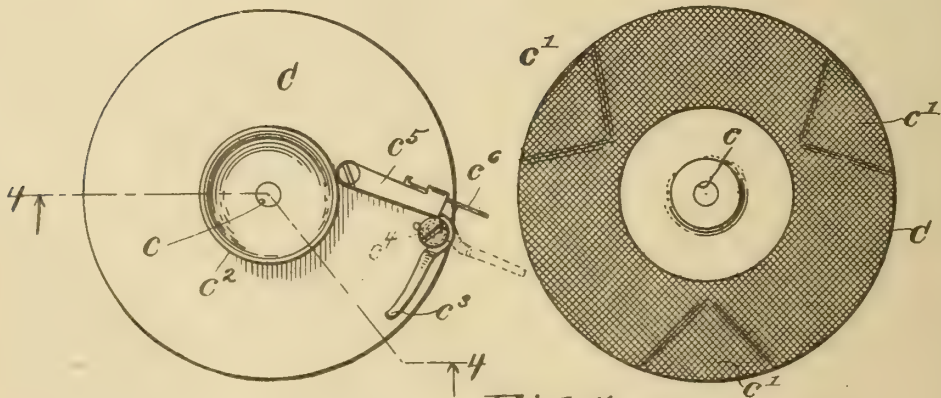
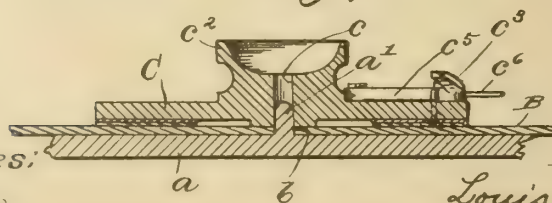


Fig. 4



Witnesses:

J. C. Tumas
Jno. F. Oberlin

Inventor:

Louis N. Hays
by J. B. Fay
Attorney.

UNITED STATES PATENT OFFICE.

LOUIS H. HAYS, OF CLEVELAND, OHIO.

ATTACHMENT FOR PHONOGRAPHS.

936,534.

Specification of Letters Patent.

Patented Oct. 12, 1909.

Application filed July 8, 1908. Serial No. 442,444.

To all whom it may concern:

Be it known that I, LOUIS H. HAYS, a citizen of the United States, resident of Cleveland, county of Cuyahoga, and State of Ohio, have invented a new and useful Improvement in Attachments for Phonographs, of which the following is a specification, the principle of the invention being herein explained and the best mode in which I have contemplated applying that principle, so as to distinguish it from other inventions.

This invention relates to phonographs or talking machines, particularly to talking machines of the disk record type such as the Victor and Columbia.

The object of the invention is the provision of a simple and inexpensive attachment for use in connection with such machines to automatically stop the same when the end of the record has been reached.

To the accomplishment of the above and related ends said invention, then, consists of the means hereinafter fully described and particularly pointed out in the claims.

The annexed drawing and the following description set forth in detail certain mechanism embodying the invention, such disclosed means constituting, however, but one of various mechanical forms in which the principle of the invention may be used.

In said annexed drawing: Figure 1 is a broken perspective view of a talking machine of the type in hand, specifically a Victor Victrola, with my improved braking attachment mounted thereon; Fig. 2 is a top plan view of such attachment; Fig. 3 is a bottom plan view of the same; Fig. 4 is a transverse section therethrough on the line 4—4, Fig. 2; and Fig. 5 is a perspective view of a sound box such as is used in machines of the class in hand, together with a clip mounted thereon to cooperate with my braking attachment as will presently appear.

Referring to the drawing, particularly Fig. 1, A will be seen to designate the cabinet or box of the machine upon the top of which, mounted on a suitable turn table *a*, shown in Fig. 4, is a flat circular disk record B of familiar construction. This disk merely frictional rests on the table *a*, being properly centered by being provided with an aperture *b* that engages with a central pin *a'* on such table, see Fig. 4. Pivotally mounted adjacent to the table so as to permit its free end to swing across the disk is the tapering arm A' that communicates with the

horn of the machine, such horn being concealed in the cabinet in the particular machine illustrated. The outer end of the horn is provided, among other things, with a sound box *a*² that bears a needle *a*³ that cooperates with the disk to produce the sound. In operating the machine, as will be recalled such needle is started at the outer edge or periphery of the disk and follows the spiral record groove until it arrives at the center.

Heretofore it has been a source of no small inconvenience in the use of machines of the class in hand to note the arrival of the needle or sound box at the end of the record, and incidental completion of the record, in order to stop the machine, which is desirable not merely to keep the motor from running down and promptly cut off the sound, but also, and more important, to prevent the tapering arm from jumping across the disk and by engagement of the needle with the disk to damage the record thereon.

My brake attachment comprises, then, a member, C designed to loosely rest on top of the disk, being held in place thereon by engaging with a central aperture *c* the same pin *a'* that serves to locate the disk on the table. This member, which is preferably made of metal and is circular in form, is provided on its under side with pads *c'* of friction material Fig. 3, preferably soft rubber, for engaging with the disk. Said member is also provided on its upper side with a knob *c*² of any suitable design whereby the member may be conveniently handled by the user. Pivotally mounted on the upper face of the member is a catch arm *c*³ adapted in one position to project beyond the edge of the member to engage the sound box *a*², or corresponding part of the machine, when such part lies within a predetermined distance from the center of the disk. A spring *c*¹, Fig. 2, tends thus to position said arm, but a trip *c*⁴ serves normally to retain the same in its inoperative position. This trip is provided with a pin *c*⁵ adjustably held therein so as to project at any desired distance beyond the member, which pin is likewise adapted to be engaged by the sound box, or preferably the needle borne by such box. This pin can accordingly be located so as to register quite exactly with the termination of the record on the disk, so that as the trip is carried around by the disk in the course of the latter's rotation it will be finally brought

up against the needle of the sound box and thereby release the catch arm c^3 . Such catch arm immediately springs into operative position and upon the completion of the next
 5 rotation of the disk and brake member it in turn engages the needle or preferably the sound box, the disposition of the parts being properly arranged with this in view. Where
 10 neither the needle or sound box afford a convenient means for such engagement I provide a clip C' in the form of an encircling spring for the sound box, such spring clip having a projecting arm c^8 that will thus en-
 15 gage with the catch arm of the brake member C . Since the engagement of this brake member with the disk is frictional only, the stopping of the machine will not be sudden and sharp as where the manually operated stop
 20 regularly employed in machines of this character, is thrown into action, but a gradual braking effect is exerted, which brings the motor governor, and other parts of the machine to a stop without shock or injury to
 25 the parts. I do not claim broadly a brake attachment for disk talking machines, comprising a member designed to rest on top of the disk, and means borne by said member adapted to
 30 engage the sound box, or corresponding part of said machine, as such part approaches the center of the disk, and priority thereto is hereby disclaimed.

Other modes of applying the principle of my invention may be employed instead of
 35 the one explained, change being made as regards the mechanism herein disclosed, provided the means stated by any one of the following claims or the equivalent of such stated means be employed.

40 I therefore particularly point out and distinctly claim as my invention:—

1. A brake attachment for talking machines, comprising a member adapted to
 45 loosely rest on the record, said member having a friction surface for engaging with said record, and radially adjustable means borne by said member and adapted to en-
 50 gage the sound-box or corresponding part of said machine as such part approaches the center of the record.

2. A brake attachment for talking machines, comprising a member adapted to
 55 loosely rest on the record, said member having a friction surface for engaging with said record, a catch borne by said member and adapted to engage the sound-box or cor-
 60 responding part of said machine when such part lies within a predetermined distance from the center of the record, said catch being normally inoperative, and a trip adapted to operatively position said catch upon being engaged by the machine part in question.

3. A brake attachment for talking machines, comprising a member adapted to

loosely rest on the record, said member having a friction surface for engaging with said record, a catch borne by said member and adapted to engage the sound-box or corresponding part of said machine when such
 70 part lies within a predetermined distance from the center of the record, said catch being normally inoperative, and a radially adjustable trip adapted to operatively position said catch upon being engaged by the ma-
 75 chine part in question.

4. A brake attachment for talking machines, comprising a member adapted to
 80 loosely rest on the record, said member being provided on its underside with pads of friction material for engaging with said record, a catch arm pivotally mounted upon
 85 said member and adapted in one position to project beyond the same to engage the sound-box or corresponding part of said machine when such part lies within a predetermined
 90 distance from the center of the record, a spring tending thus to position said arm, and a trip adapted normally to retain said arm in its inoperative position but to release
 the same upon being engaged by the machine part in question.

5. In a talking machine, the combination with the record and sound-box or corresponding part of the machine coöperative
 95 with said record, of a member resting on said record, and radially adjustable means borne by said member and adapted to engage the machine part in question as such part approaches the center of said record.

6. In a talking machine, the combination with the record and sound-box or corresponding part of the machine coöperative
 100 with said record, of a flat member loosely resting on said record, said member having a friction surface for engaging with said record, and radially adjustable means borne by said member and adapted to engage the machine part in question as such part approaches the center of said record.

7. A brake attachment for talking machines, comprising a member adapted to
 105 loosely rest on the record, said member being provided on its underside with pads of friction material for engaging with said record, a catch arm pivotally mounted upon
 110 said member and adapted in one position to project beyond the same to engage the sound-box or corresponding part of said machine when such part lies within a predetermined
 115 distance from the center of the record, a spring tending thus to position said arm, a trip pivotally mounted adjacent to said arm and adapted normally to retain the same in its inoperative position, and a member ad-
 120 justably secured to said trip and adapted to be extended to engage the machine part in question as the latter approaches the center of the record.

8. In a talking machine, the combination

with the record and sound-box of the machine coöperative with said record, of a member resting on top of said record, said sound-box bearing a projection forwardly of its needle adapted to be engaged by said member as said sound-box approaches the center of said record.

9. In a talking machine, the combination with the record and sound-box of the machine coöperative with said record, of a member resting on top of said record, and a second member removably secured to said sound-box and provided with a projection adapted to lie forwardly of the needle of said sound-box and to be engaged by said first-named member as said sound-box approaches the center of said record.

10. In a talking machine, the combination with the record and sound-box of the machine coöperative with said record, of a member resting on top of said record, and a spring clip removably secured to said sound-box and provided with a projection adapted to be engaged by said member as said sound-box approaches the center of said record.

11. In a disk talking machine, the combination with a record and sound-box of the machine, said box being provided with the usual needle, of a spring clip removably secured to said sound-box and provided with a

projection, a flat member loosely resting on said record, said member being provided on its under side with pads of friction material for engaging with said record, a catch arm pivotally mounted upon said member and adapted in one position to project beyond the same to engage with the clip on said sound-box when the latter lies within a predetermined distance from the center of said record, a spring tending thus to position said arm, and a trip adapted normally to retain said arm in its inoperative position but to release the same upon being engaged by the needle wherewith said box is provided.

12. A clip provided with a projection and adapted to be removably secured to the sound-box of a talking machine, substantially as described.

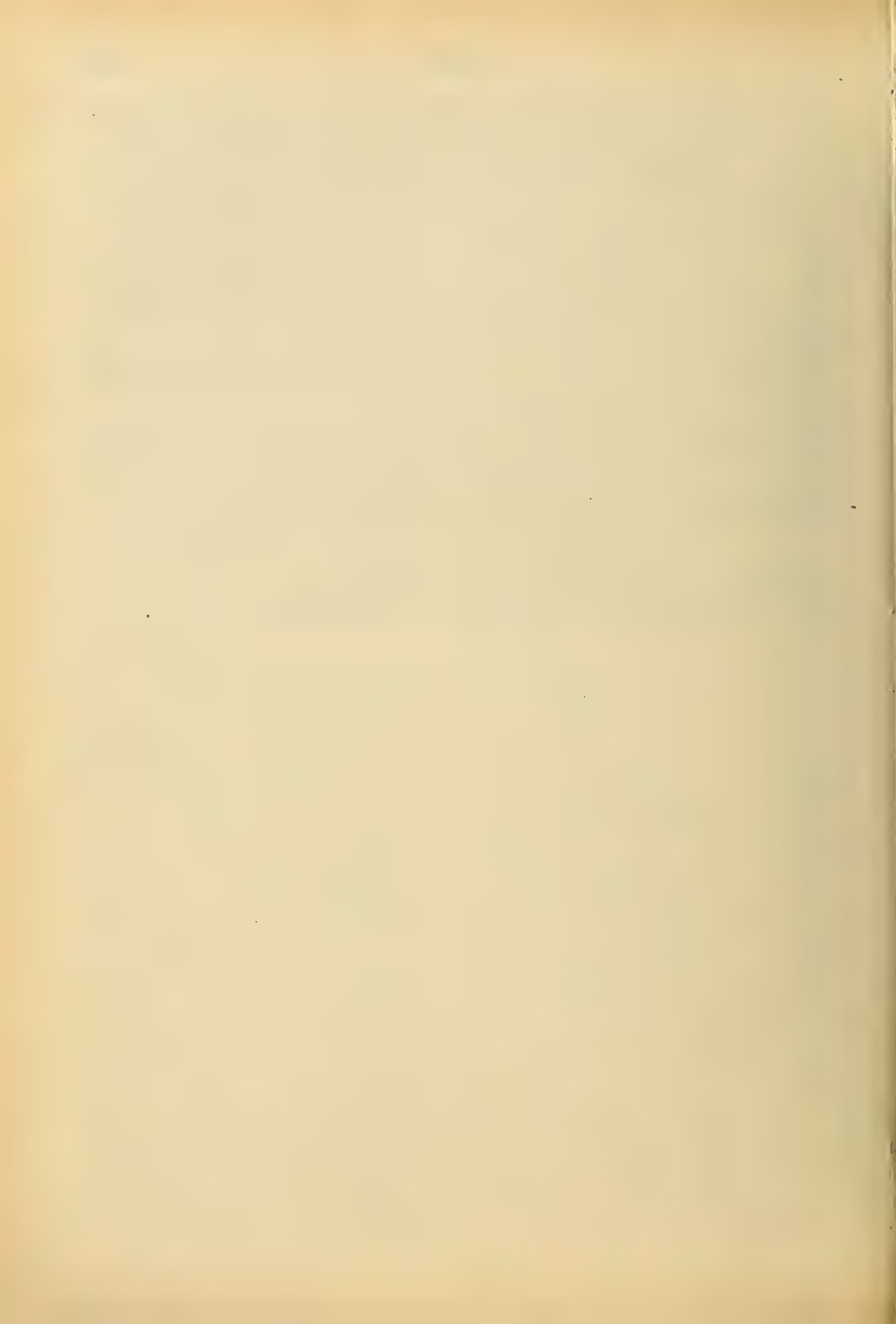
13. A spring clip provided with a projection and adapted to be removably secured to the sound-box of a talking machine, said projection lying forwardly of the needle of said sound-box when said clip is secured thereon, substantially as described.

Signed by me this 27th day of June, 1908.

LOUIS H. HAYS.

Attested by—

CHRISTINE ARUS,
JNO. F. OBERLIN.



1000



T. H. MACDONALD.

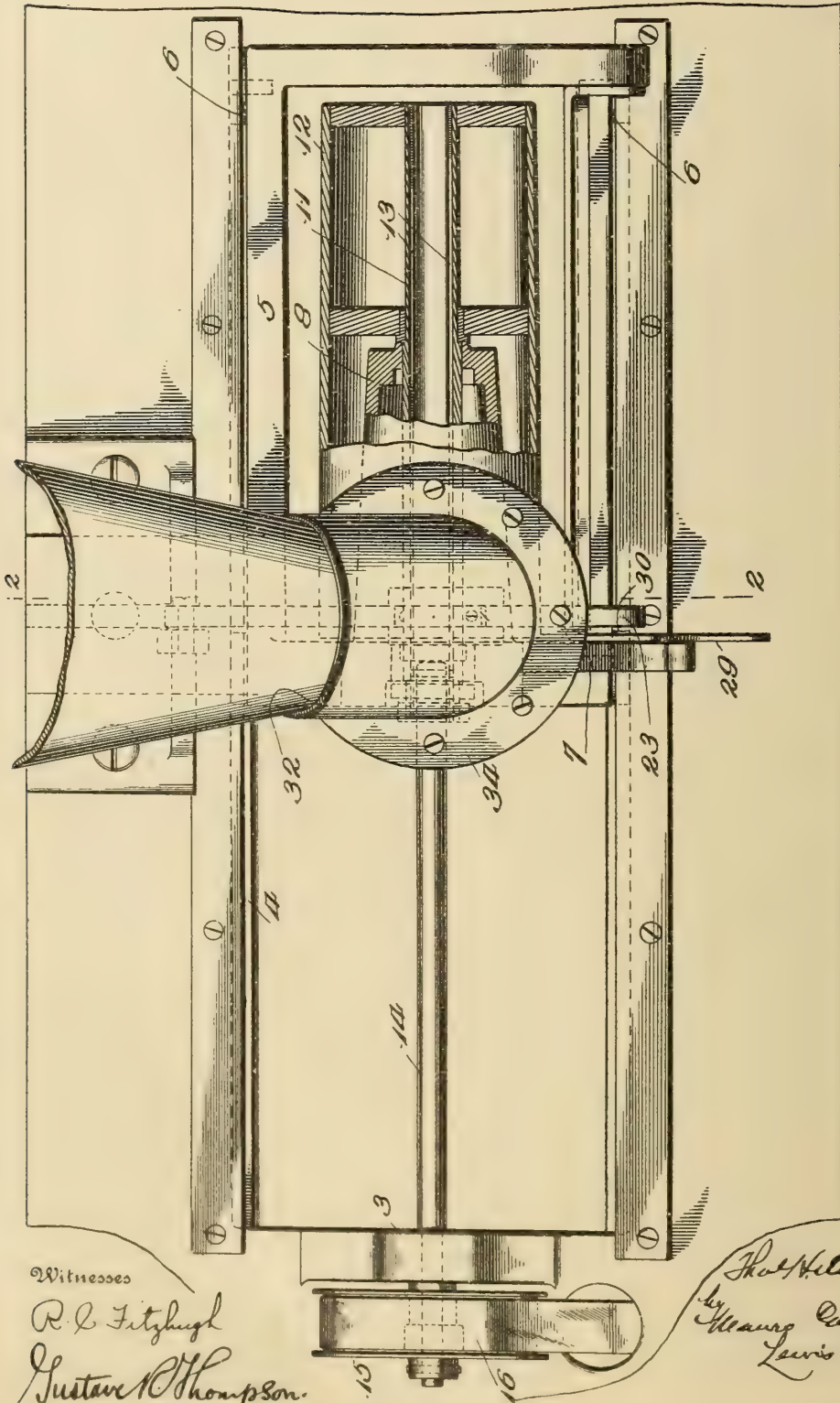
GRAPHOPHONE.

APPLICATION FILED APR. 27, 1907.

936,646.

Patented Oct. 12, 1909.

3 SHEETS—SHEET 1.

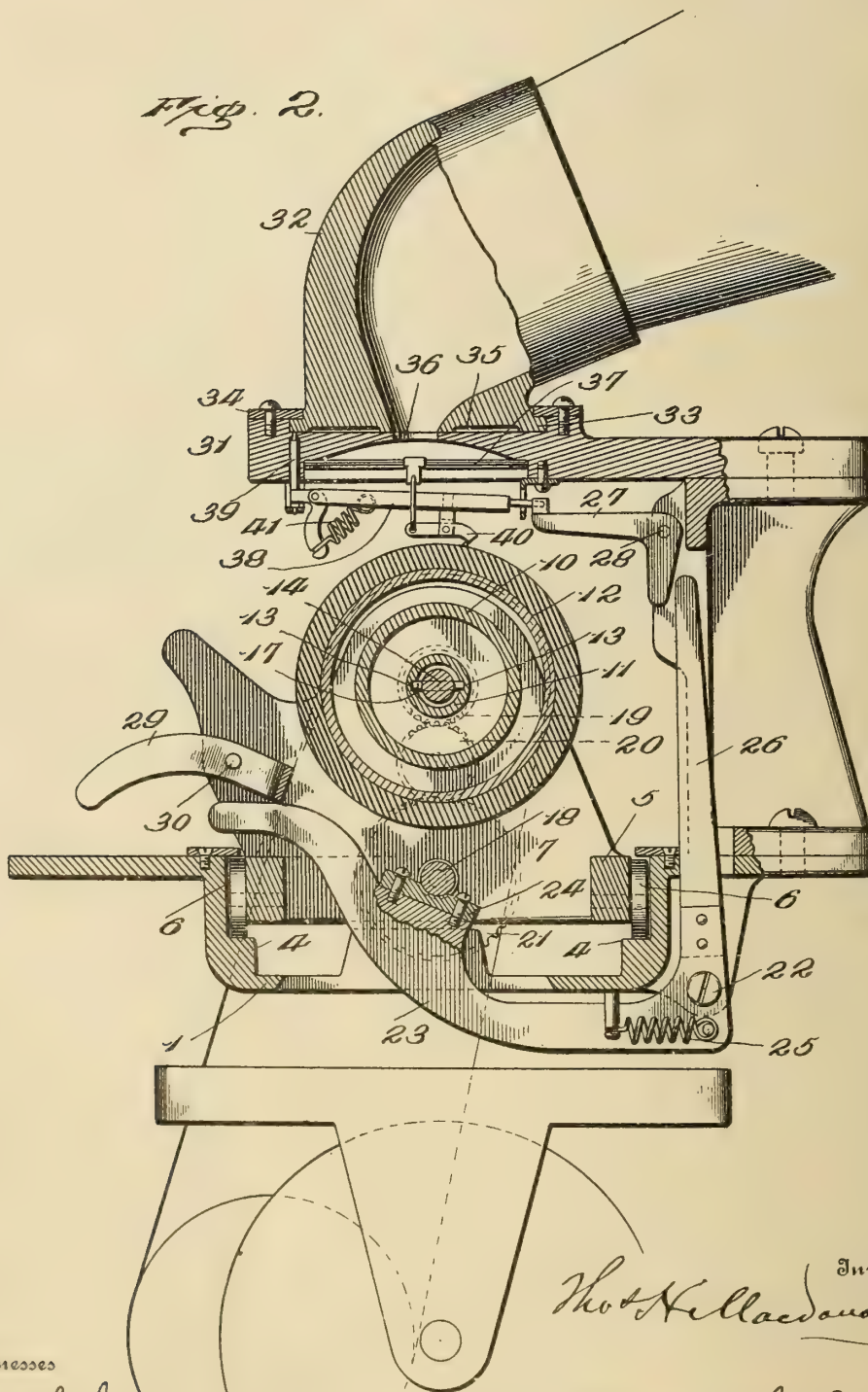




T. H. MACDONALD.
GRAPHOPHONE.
APPLICATION FILED APR. 27, 1907.

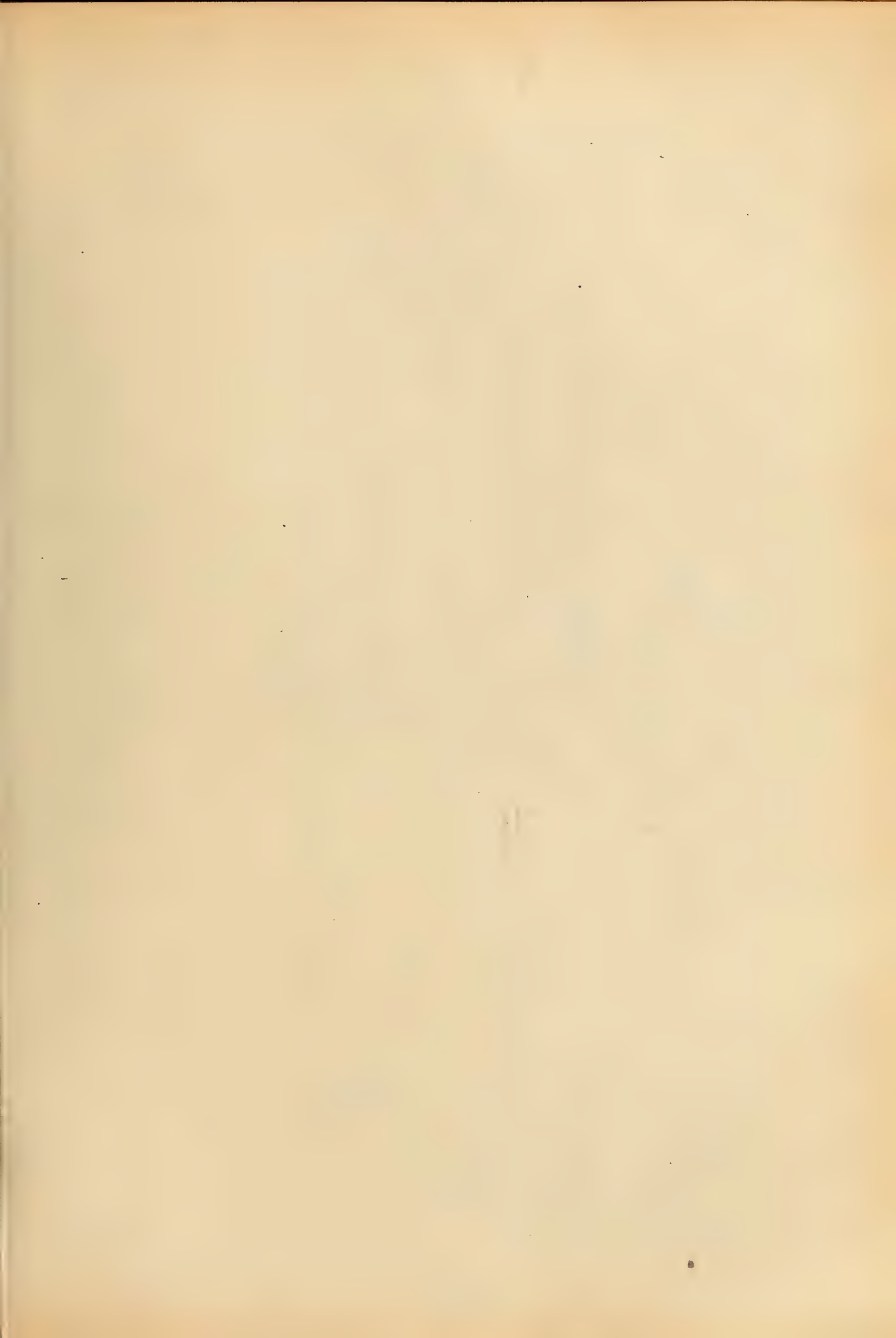
936,646.

Patented Oct. 12, 1909.
3 SHEETS—SHEET 2.



Witnesses
R. L. Fitzhugh
Gustave R. Thompson.

Inventor
Thos. H. Macdonald
By *Mauro Cameron Lewis Dunsen*
Attorneys



T. H. MACDONALD.
GRAPHOPHONE.
APPLICATION FILED APR. 27, 1907.

936,646.

Patented Oct. 12, 1909.
3 SHEETS—SHEET 3.

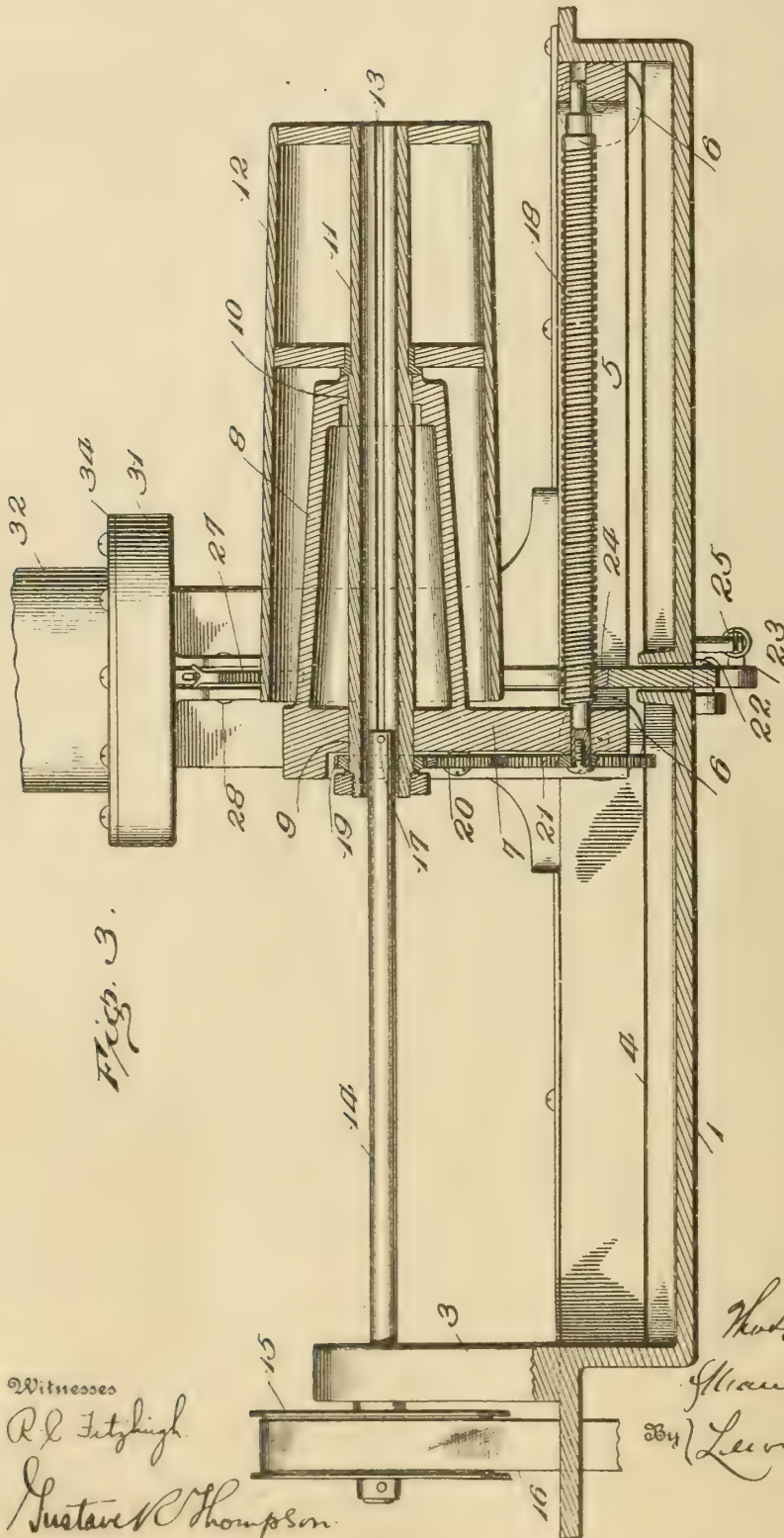


Fig. 3.

Witnesses

R. L. Fitzgibbon

Gustave Thompson

Inventor
Thos. H. Macdonald

Glaucus Cameron

By Lewis Morris

his Attorney

UNITED STATES PATENT OFFICE.

THOMAS H. MACDONALD, OF BRIDGEPORT, CONNECTICUT, ASSIGNOR TO AMERICAN GRAPHOPHONE COMPANY, OF BRIDGEPORT, CONNECTICUT, A CORPORATION OF WEST VIRGINIA.

GRAPHOPHONE.

936,646.

Specification of Letters Patent.

Patented Oct. 12, 1909.

Application filed April 27, 1907. Serial No. 370,563.

To all whom it may concern:

Be it known that I, THOMAS H. MACDONALD, of Bridgeport, Connecticut, have invented a new and useful Improvement in
5 Graphophones, which improvement is fully set forth in the following specification.

This invention relates to graphophones, and has for its object to provide a machine of this character which shall be simple in
10 construction, with a direct connection from the sound-box into the amplifying horn used in such machines, without any loose joints between the sound-box and the horn; to provide a rigid horn support, and generally a
15 more compact construction in that form of machine which employs a cylindrical record.

With these objects in view, the invention consists of the arrangement and combination of elements hereinafter described and
20 then pointed out in the claims.

One mechanical expression of the inventive idea is, for the purpose of illustration, shown in the accompanying drawings, in which—

25 Figure 1 is a top plan view with parts broken away; Fig. 2 is a cross-section on the line 2—2, Fig. 1; and Fig. 3 is a central longitudinal section.

Referring to the drawings, 1 is a suitable
30 frame provided with a vertical upright 3, and provided with a suitable track or raceway such as the ledges 4, 4. A carriage 5, preferably provided with wheels 6, 6, rests upon this track or raceway, said carriage
35 having at one end a vertical upright 7 with an outwardly projecting and preferably hollow bracket piece 8. The upright 7 and the bracket piece 8 are provided with bearings 9 and 10 respectively, within which is mounted
40 to turn a hollow mandrel shaft 11 supporting a mandrel 12. This mandrel shaft has, on diametrically opposite sides of its interior, spline-grooves 13, 13.

Turning in bearings in the upright 3 is a
45 shaft 14 having on its exterior end pulley 15 driven by belt 16 extending from the motor. On the opposite end of the shaft 14 is a pin 17 whose outwardly projecting ends extend into the spline-grooves 13 on the interior of
50 the mandrel shaft 11 with which the propelling-shaft 14 is arranged to telescope. Beneath the mandrel, propelling screw 18 is mounted in the carriage 5, with one end projecting through the bearing in the carriage, and a

train of gears 19, 20 and 21 connect the mandrel shaft 11 with the propelling screw 18.

Pivoted to the frame 1 at 22 is a lever 23 bearing a nut 24, which nut is normally held in engagement with the propelling screw 18 by the spring 25 secured at one end to the
60 lever 23 and at the other end to the frame of the machine, as shown. Rigidly secured to and preferably integral with the lever 23 is an upwardly projecting arm 26, whose upper end is in position to wipe against one arm
65 of bell-crank-lever 27, pivoted to the frame of the machine at 28, the other arm of the lever 27 being in position to lift the reproducer, so as to throw the style out of engagement with the record when the lever 23 is
70 operated against the tension of the spring 25, by which operation the nut 24 is disengaged from the propelling screw. As a convenient means for thus actuating the lever 23, a lever 29 is pivoted to the frame at 30
75 with one arm in position to engage the lever 23 when the outwardly projecting end of the lever 29 is lifted, as will be readily understood.

Rigidly secured to the frame 1 is the
80 sound-box 31 with the amplifying horn 32 secured directly upon the back thereof, preferably so as to swing around, to the end that the horn may be directed to any point of the compass. This connection in the present instance is shown as secured by forming
85 a suitable recess in the back of the sound-box 31, within which the flanged end 33 of the horn snugly fits, but without binding, and an annulus 34 is secured to the sound-box, with its inner edge projecting over the flange 33 of the horn, as clearly shown in Fig. 2. For the purpose of avoiding unnecessary friction, the end of the horn, or more properly speaking, the elbow thereof,
95 has an annular recess 35 formed therein. The interior of the horn adjacent to the part where it joins the sound-box is tapered or conical, with its smallest point provided with an opening registering with a suitable hole
100 or opening 36 in the top or back of the sound-box. The sound-box is provided with the usual or any suitable diaphragm 37, and with a stylus bar or lever 38 pivoted at 39 to the frame and carrying a stylus lever 40
105 which is connected to the diaphragm, as by a suitable thread or other connection. The stylus bar or lever 38 is normally held de-

pressed by the action of a spring 41, the outer end of said lever being in the path of the upward movement of the bell-crank-lever 27, to the end that when said latter lever is actuated this stylus will be elevated from the record. This general construction of reproducer is one shown, described and claimed in a previous application of mine, and need not, therefore, be further herein described in detail.

Operation: As shown in the drawings, the parts are in the position which they occupy at the time when the reproduction of a record has begun, the nut 24 being in engagement with the propelling screw 18, and the reproducing stylus being in engagement with the record. When power is applied to the shaft 14 it revolves the mandrel 12 by reason of the engagement of the pin 17 and the splines 13 of the hollow mandrel shaft 11; and by reason of the chain of gearings 19, 20 and 21 the propelling screw 18 is revolved; and by reason of the engagement of this screw with the nut 24 the carriage 5 is propelled along the ways 4, 4, the shaft 14 telescoping with the mandrel shaft 11 during this movement. When it is desired to stop the machine, the lever 29 is raised, thereby disengaging the nut from the propelling screw and causing the lever 27 to elevate the stylus to disengage it from the record.

It will be observed that there is thus provided a very compact construction, with a rigid horn support, which horn has direct connection with the sound-box, without any movable or loose joints between the horn and the sound-box which would interfere to a greater or less extent with the correct transmission of the sound waves from the sound-box to the amplifying horn.

What I claim is:

1. In a graphophone, the combination of a carriage, a mandrel shaft and operating screw mounted to revolve therein, a record-carrying mandrel on said shaft, a nut fixed on the machine and engaging said screw, a

power shaft operatively connected to said mandrel shaft and operating screw, a sound-box fixedly mounted with relation to the mandrel, and an amplifying horn directly mounted on the sound-box.

2. In a graphophone, a frame, a track or way on said frame, a carriage movable on said way, a revoluble mandrel and an operating screw mounted to turn on said carriage, a power shaft having bearing on said frame and operatively connected to said mandrel, a train of gearing between said mandrel and screw, a nut on the frame engaging said screw, a sound-box fixed to the frame, and an amplifying horn mounted directly on said sound-box.

3. In a graphophone, the combination of a fixedly mounted sound-box, a hollow mandrel, a hollow mandrel shaft supporting the same, a bearing for said shaft projecting into said mandrel, a power shaft telescoping with and splined to said mandrel shaft, an operating screw and nut one of which is fixed and the other of which moves longitudinally with the mandrel, and operative connections between the power shaft and the one of these elements which moves longitudinally with the mandrel.

4. In a graphophone, the combination of a fixedly mounted sound-box, a carriage, a revoluble mandrel and an operating screw on said carriage, a lever pivoted to the machine frame and bearing a nut engaging said screw, a record on the mandrel, a stylus on the sound-box engaging the record, and means operated by said lever when it is moved to disengage the nut from the screw, which means lifts the stylus from the record.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

THOMAS H. MACDONALD.

Witnesses:

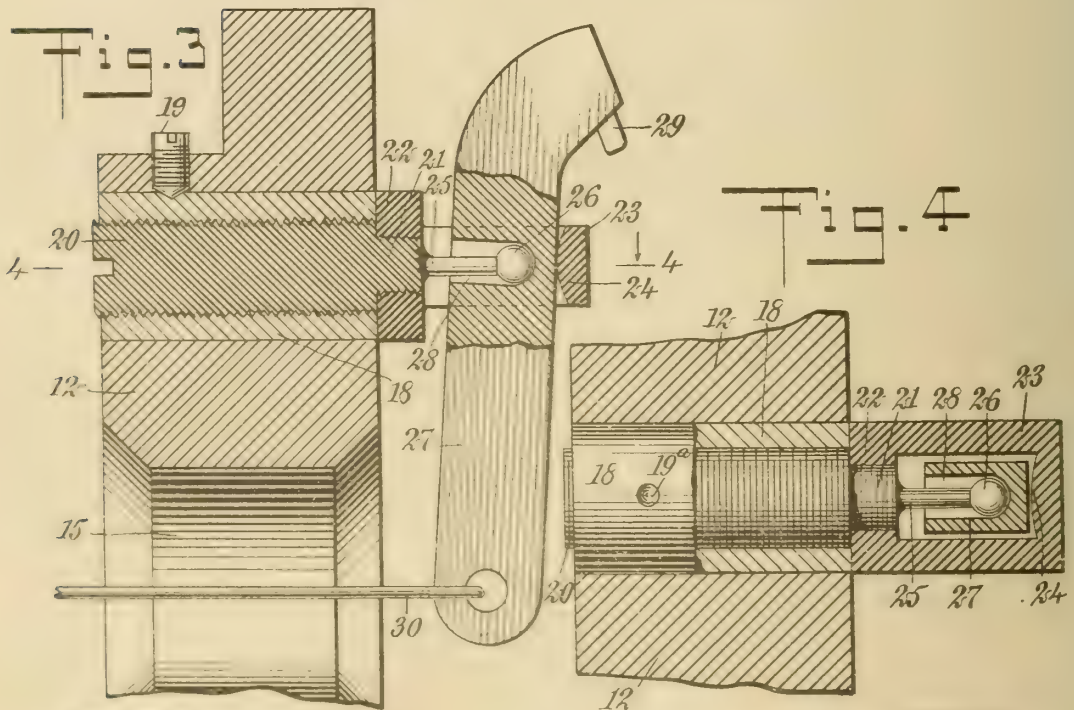
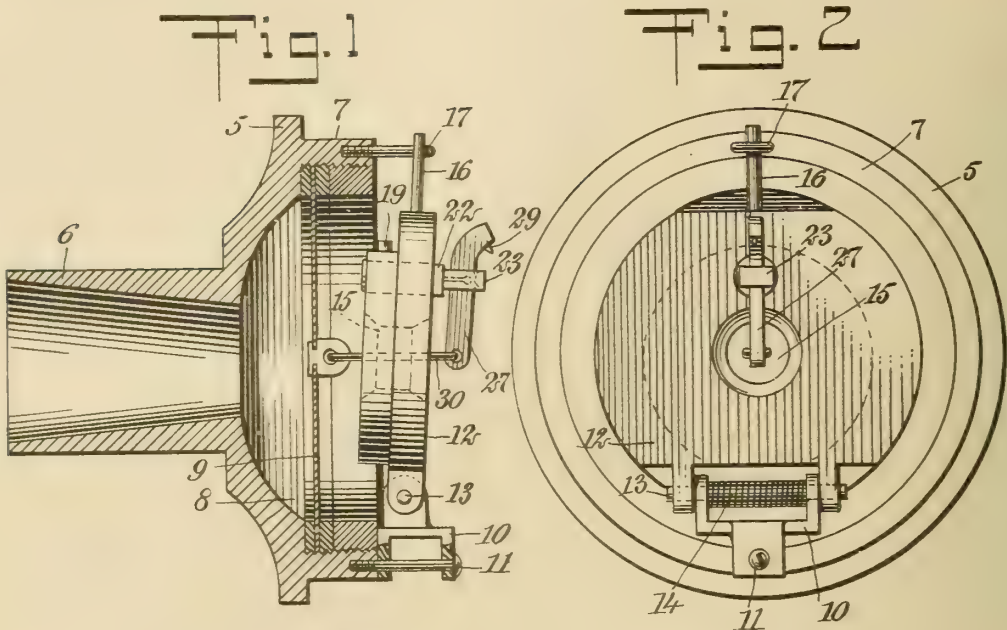
C. A. GIBNER.

L. B. NICHOLSON.

R. B. SMITH.
 PHONOGRAPHIC REPRODUCER.
 APPLICATION FILED MAR. 1, 1909.

936,826.

Patented Oct. 12, 1909.



WITNESSES
John Bergstrom
W. C. Harrison

INVENTOR
Richard Bartholomew Smith
 BY *Wm. Co.*
 ATTORNEYS

UNITED STATES PATENT OFFICE.

RICHARD BARTHOLOMEW SMITH, OF NEW YORK, N. Y., ASSIGNOR TO INDESTRUCTIBLE
PHONOGRAPHIC RECORD CO., OF BROOKLYN, NEW YORK.

PHONOGRAPHIC REPRODUCER.

936,826.

Specification of Letters Patent.

Patented Oct. 12, 1909.

Application filed March 1, 1909. Serial No. 480,550.

To all whom it may concern:

Be it known that I, RICHARD BARTHOLOMEW SMITH, a subject of the King of Great Britain, and a resident of the city of New York, borough of Manhattan, in the county and State of New York, have invented a new and Improved Phonographic Reproducer, of which the following is a full, clear, and exact description.

My invention relates primarily to phonographic reproducers, but may also be used in connection with phonographic records and generally in all relations where there is a stylus lever controllably by, or employed for the purpose of controlling, a diaphragm in order to record or reproduce sounds.

More particularly stated, my invention comprehends a stylus lever balanced upon a pin by aid of a single ball joint, thus reducing friction to a minimum and enabling the lever to be more easily retained in balance.

My invention further contemplates a stirrup which encircles the stylus lever and joint above mentioned, in order to hold the stylus lever in proper working relation to the ball.

My invention still further contemplates means whereby the stylus lever, though encircled by said shoe and fitting the same neatly, turns upon the ball as a center and carries with it, as it turns, the stirrup.

I find that a stylus lever can be given great freedom of movement in various directions, and that the friction of the lever and parts immediately associated therewith, is greatly reduced by the mechanism herein described, and also that the use of this mechanism tends to improve the quality richness of the tones reproduced or recorded by the device. Of course, it would be an easy matter to give a stylus lever a considerable range of idle movement, but this is not the sole purpose of my mechanism. What I seek more particularly to do is to give the stylus lever a wide range of movement, whereby it may perform a large variety of movements in different directions and varying considerably in character, these movements, however, being faithfully transmitted to or from the diaphragm, as the case may be, and thereby caused to vary, for their betterment, the tones being recorded or reproduced.

While it is impracticable to show and describe the multifarious forms which may be assumed by my invention, I show a single

representative form, this being sufficient to enable persons skilled in the art to understand the principles involved and to make and use the construction.

Reference is to be had to the accompanying drawings forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 is a substantially central vertical section through a phonographic reproducer made in accordance with my invention, this view disclosing a movable weight and a stylus lever pivotally mounted relatively to said weight by aid of my improved ball joint; Fig. 2 is a rear elevation of the reproducer; Fig. 3 is an enlarged fragmentary section through the upper portion of the reproducer, showing the stylus lever and my improved mounting for the same; and Fig. 4 is a fragmentary section substantially upon the line 4-4 of Fig. 3.

At 5 is a dome-like casing which is provided with a neck 6 for facilitating the attachment of a horn. The casing 5 is provided with an annular portion 7 and with a compartment 8 in which is mounted a diaphragm 9. A bracket 10 is, by aid of a pin 11, mounted upon the annular portion 7. A weight 12 having generally an annular form is journaled by aid of a pin 13 upon the bracket 10. A spiral spring 14 connected with the bracket 10 and with the weight, gives the weight more or less tension relatively to other parts. The weight is provided with a central opening 15. Mounted upon the weight and projecting radially therefrom is a pin 16 which engages a hook 17, thus serving as a limiting stop for motions of the weight 12.

A sleeve 18 extends entirely through the weight 12 and is secured rigidly thereto by aid of a set screw 19 which fits into a bearing 19^a, this bearing being shown in Fig. 4. The sleeve 18 is threaded internally, and extending entirely through it is a bolt 20 which is provided with a reduced portion 21 also threaded, and revolvably fitted upon this reduced portion is a collar 22 threaded internally and provided with a stirrup 23 integral with it.

The stirrup 23 is provided internally with a convex surface 24. Mounted rigidly upon the reduced portion 21 of the bolt 20 is a neck 25 carrying a head 26, the latter being

spherical and polished. A stylus lever is shown at 27 and is provided with a hole 28 extending about three quarters of the distance through it and terminating in a rounded bottom, as will be understood from Figs. 3, 4. The stylus lever engages the convex surface 24, which serves as a limiting stop for it, the ball 26 fitting neatly into the bottom of the hole 28 and preventing undue play of the stylus lever.

At 29 is a jewel which is mounted upon the stylus lever and is used in the manner heretofore known for engaging a rotating cylinder or disk. A link 30 connects the stylus lever with the diaphragm 9. The stylus lever is free to turn in two planes crossing each other, one coinciding with the axis of the threaded bolt 20 and its neck 25, the other plane crossing the axis just mentioned. These two movements in different planes are what might be termed "general swinging movements". Aside from this, the stylus lever 27 has a local rocking movement upon the ball 26 as a center.

The stirrup 23 has a slight turning movement, owing to the fact that the collar 22 does not fit tightly upon the reduced portion 21 of the bolt 20, and to the additional fact that the collar 32 is not ordinarily tightened against the sleeve 18 or against the weight 12. My purpose in leaving the collar 22 slightly loose is to facilitate the freedom with which the stirrup can turn, and in this way I increase the freedom of action of the stylus lever. I call especial attention to the slight rocking movement, above referred to, of the stylus lever 27 upon the ball 26 as a center. This last-mentioned rocking movement is quite small in degree, owing to the fact that it is limited by the stirrup 23, as will be seen from Fig. 4. Such movement as thus takes place, however, occurs with great freedom, owing to the fact that the stylus lever 27 can easily turn upon its general longitudinal axis and also to the fact that such turning movement is facilitated by the convex bottom 24 of the stirrup.

I have found that the particular depth given to the hole 28 might modify in a great measure the character of the work done by the stylus lever. Where stylus levers of ordinary form are employed, the hole 28 should be quite deep, extending, in the particular instance here shown, considerably past the central axial line of the stylus lever. In doing this, the ball 26, in exerting pressure against the stylus lever, tends to maintain the stylus lever in true position.

It will be noted that the portion of the ball 26 sustaining the pressure is, by the depth of the hole 28, brought to a point comparatively close to an imaginary line connecting the two points where pressure is applied on the ends of the stylus lever. This fact tends to steady the rocking action of

the lever in a plane coinciding with the axis of the bolt 20. The pull of the link 30 upon the diaphragm 9 and upon the stylus lever 27 tends to maintain the stylus lever in proper general position when the jewel 29 is pressed upon by the cylinder or disk, so that generally the stylus lever is in stable equilibrium, as well as in its normal position, in case no force is applied to move this stylus lever sidewise. If, however, there be, for any reason, a slight tendency to rock the stylus lever upon the ball 26 as a center, in a plane crossing the general length of the stylus lever, the latter is free to yield and as soon as the disturbing force is removed the lever tends to assume its normal position.

While I show the stylus lever 27 as conveniently supported by aid of the weight 12, I do not limit myself to this particular arrangement, for obviously the stylus lever can be supported in any manner known in this art. Neither do I limit myself to the particular construction shown for the stylus lever nor for the parts immediately associated with it.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:

1. The combination of a casing, a diaphragm mounted therein, a weight movable relatively to said casing, a ball connected with said weight and supported thereby, and a stylus lever provided with a hole having a hemispherical bottom, said hole being fitted over said ball, and a link connected with said stylus lever and with said diaphragm.

2. A device of the character described, comprising a weight, a neck connected therewith and extending a little therefrom, a ball mounted upon said neck, and a stylus lever provided with a hemispherical bearing surface engaging said ball so as to swivel the same, and means for preventing said stylus lever from moving away from said ball.

3. The combination of a stylus lever, a weight relatively to which said stylus lever is journaled, and a stirrup movable relatively to said weight and encircling said stylus lever.

4. The combination of a weight, a member extending therefrom and provided with a bearing surface, a lever engaging said bearing surface and adapted to rock relatively to said weight, and a stirrup carried by said weight and movable relatively to the same, said stirrup encircling said stylus lever.

5. The combination of a supporting member, a stylus lever journaled relatively to the same, a collar encircling a portion of said supporting member and movable relatively to said portion, and a stirrup connected with said collar and encircling said stylus lever.

6. The combination of a stirrup provided with a convex surface, a stylus lever engag-

ing said convex surface of said stirrup, and a member engaging said stylus lever and provided with a portion serving as a bearing upon which said stylus lever may turn.

5 7. The combination of a stylus lever provided with a hole extending nearly through it, a ball mounted upon a support and extending to the bottom of said hole, and means for connecting said stylus lever to a
10 diaphragm.

8. The combination of a stylus lever, means for connecting the same to a diaphragm, a stirrup encircling said stylus lever, and a support carrying said stirrup,
15 said stirrup being movable relatively to said support.

9. In a device of the character described, the combination of a stylus lever having adjacent to its ends two points of suspension
20 and intermediate these ends having a hole extending into said stylus lever to a point quite close to an imaginary straight line joining said points of suspension at the ends of said stylus lever, and a member provided
25 with a ball extending into said hole for the purpose of enabling said stylus lever to turn thereupon.

10. The combination of a weight provided

with a projecting member extending therefrom, a stylus lever journaled upon said member thus projecting, and a stirrup carried by said weight and encircling said stylus lever. 30

11. The combination of a weight, a sleeve extending entirely through the same, means
35 for securing said sleeve rigidly in relation to said weight, a threaded bolt extending through said sleeve and provided with a reduced portion, a neck mounted upon said reduced portion and provided with a head
40 having a spherical form, a stylus lever provided with a hole into which said head fits, and means for preventing said stylus lever from leaving said head.

12. The combination of a weight, a sleeve
45 extending therethrough, a bolt extending through said sleeve, a stylus lever, and means carried by said bolt for engaging said stylus lever and forming therewith a ball joint.

In testimony whereof I have signed my
50 name to this specification in the presence of two subscribing witnesses.

RICHARD BARTHOLOMEW SMITH.

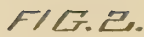
Witnesses:

WALTON HARRISON,
JOHN P. DAVIS.

HORN.

936,910.

FIG. 1.



W^m F. Taylor.
Alfred T. Sage.

INVENTOR

By

Hugh J. Kingsley.
E. B. Stocking
Attorney

UNITED STATES PATENT OFFICE.

HUGH J. KINGSLEY, OF RUTLAND, VERMONT.

HORN.

936,910.

Specification of Letters Patent.

Patented Oct. 12, 1909.

Application filed July 9, 1908, Serial No. 442,680. Renewed March 12, 1909. Serial No. 483,028.

To all whom it may concern:

Be it known that I, HUGH J. KINGSLEY, citizen of the United States, residing at Rutland, county of Rutland, and State of Vermont, have invented certain new and useful Improvements in Horns, of which the following is a specification, reference being had therein to the accompanying drawing.

This invention relates to a horn or megaphone, and particularly to such a structure formed from a sheet or blank.

The invention has for an object to provide a sheet having inclined side edges, one of which is provided with an inset recess and the other with a projecting interlocking tongue. The blank may also be provided with fold line indications upon its sides and top so as to permit the folding of the edges upon the body thereof to provide a double thickness of material thus stiffening the sheet for use as a fan.

Other and further objects and advantages of the invention will be hereinafter fully set forth and the novel features thereof defined by the appended claims.

In the drawing:—Figure 1 is a plan of the blank; Fig. 2 is a perspective of the blank rolled into a megaphone. Fig. 3 is a plan thereof when folded as a fan.

Like numerals refer to like parts in the several views of the drawing.

The numeral 10 designates the blank which may be of any desired material of sufficient stiffness and adapted to be readily rolled or folded, for instance, cardboard. This blank is adapted to receive any character of printed matter, for instance, at 11 a title and directions for use, or a scoring space for games, as indicated at 12, while the remainder of the blank may be utilized for advertising spaces as indicated at 13. This blank is provided with its side edges 14 inclined toward each other and is preferably of segmental form although not necessarily so. When of segmental form the free edge 15 is curved and the lower edge 16 also curved. The sides 14 are provided with any character of interlocking means, a desirable form comprising the tongue 17 upon one side and adapted to enter the recess 18 at the opposite edge and to be held by the lugs 19 thereof engaging the extended lugs 20 on the tongue. When the parts are so engaged a tube is produced comprising a frustum of

a cone particularly adapted for use as a megaphone. The blank is also provided at its side edges with fold line indications 21 and at the bottom with a similar fold line indication 22 in order to adapt the blank to be used as a fan by bending the sides edges 14 of the blank so as to carry the interlocking means into engagement with the body thereof, and stiffening the lower portion by folding a part thereof against the body of the blank thus bracing the edges of the blank for use as a fan rendering it sufficiently rigid for use for that purpose.

It will be seen that the invention comprises a simple blank which may be formed by a single cutting operation, this blank being adapted for use as a score or program card, and to receive advertising matter if so desired, while it may also be readily rolled and secured to form a megaphone or the edges thereof folded to produce a fan thus adapting it for a plurality of uses in connection with outdoor games or sports. The simplicity of the invention permits its very economical manufacture and ready adoption for the use desired and combines the functions of several articles in a single device, as whether used as a megaphone or fan the printed matter thereon will be clearly visible and can be utilized.

Having described my invention and set forth its merits, what I claim and desire to secure by Letters Patent is:

1. As an article of manufacture, a horn comprising a sheet having side edges inclined toward each other one of said edges being provided with a recess extending inward from the outer line thereof, and a projecting tongue upon the opposite edge co-operating with said recess.

2. As an article of manufacture, a horn comprising a sheet having side edges inclined toward each other, one of said edges being provided with a recess extending inward from the outer line thereof, a projecting tongue upon the opposite edge co-operating with said recess, and fold line indications upon said sheet at the inner side of said tongue and recess to guide the fold of said edges upon the body of the sheet.

3. As an article of manufacture, a horn comprising a sheet having side edges inclined toward each other one of which is provided with an inwardly extending recess

having lugs at its opposite ends, and a projecting tongue upon the cooperating edge having at its opposite ends interlocking lugs.

4. As an article of manufacture, a horn comprising a sheet having curved upper and lower edges and side edges inclined toward each other, one of said side edges being provided with an inset recess having lugs at its opposite ends, the cooperating side edge be-

ing formed with a projecting tongue having cooperating interlocking lugs at the ends thereof.

In testimony whereof I affix my signature in presence of two witnesses.

HUGH J. KINGSLEY.

Witnesses:

P. F. McDONOUGH,

E. H. TAYLOR.

E. M. BERLINER.
RECORD FOR SOUND REPRODUCING MACHINES.
APPLICATION FILED OCT. 3, 1908.

936,976.

Patented Oct. 12, 1909.
2 SHEETS—SHEET 1.

Fig. 1.

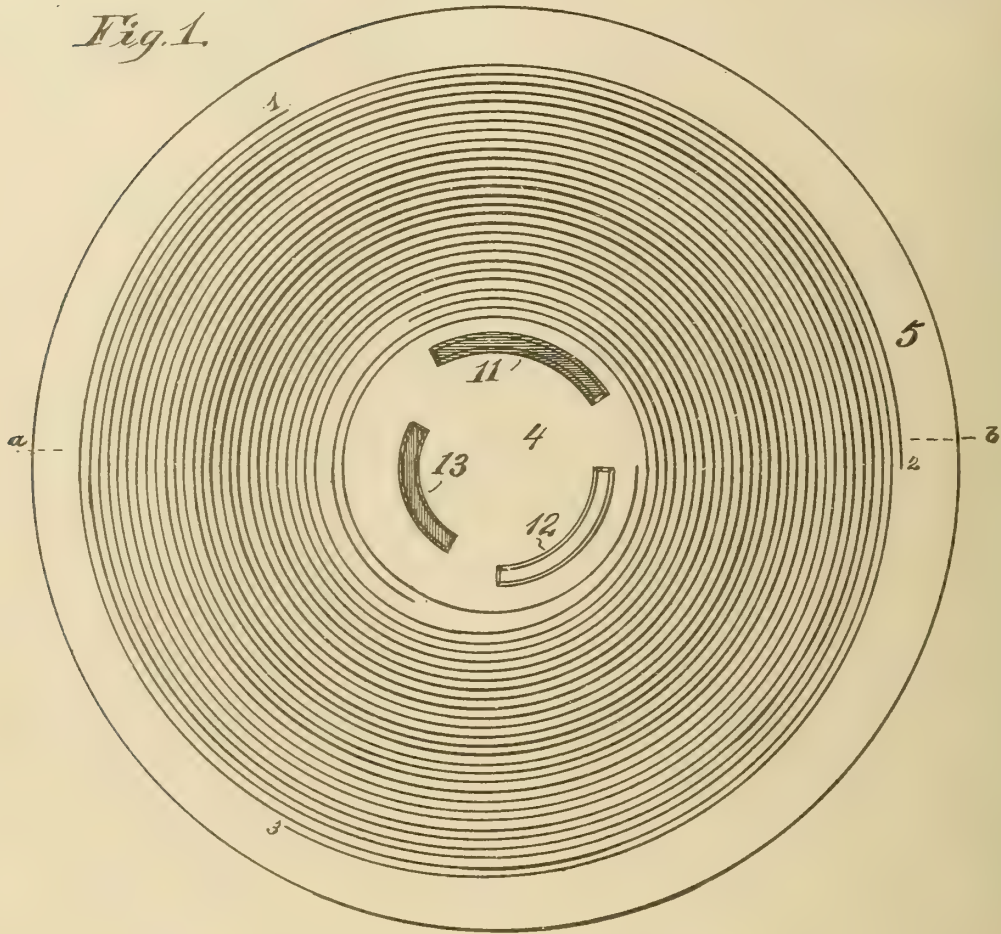


Fig. 2.



Witnesses
Thos M. Macfarland
E. E. Webb

Inventor
Edgar M. Berliner,
By Eugene W. Johnson,
Attorney



E. M. BERLINER.
 RECORD FOR SOUND REPRODUCING MACHINES.
 APPLICATION FILED OCT. 3, 1908.

936,976.

Patented Oct. 12, 1909.
 2 SHEETS—SHEET 2.

Fig. 3.

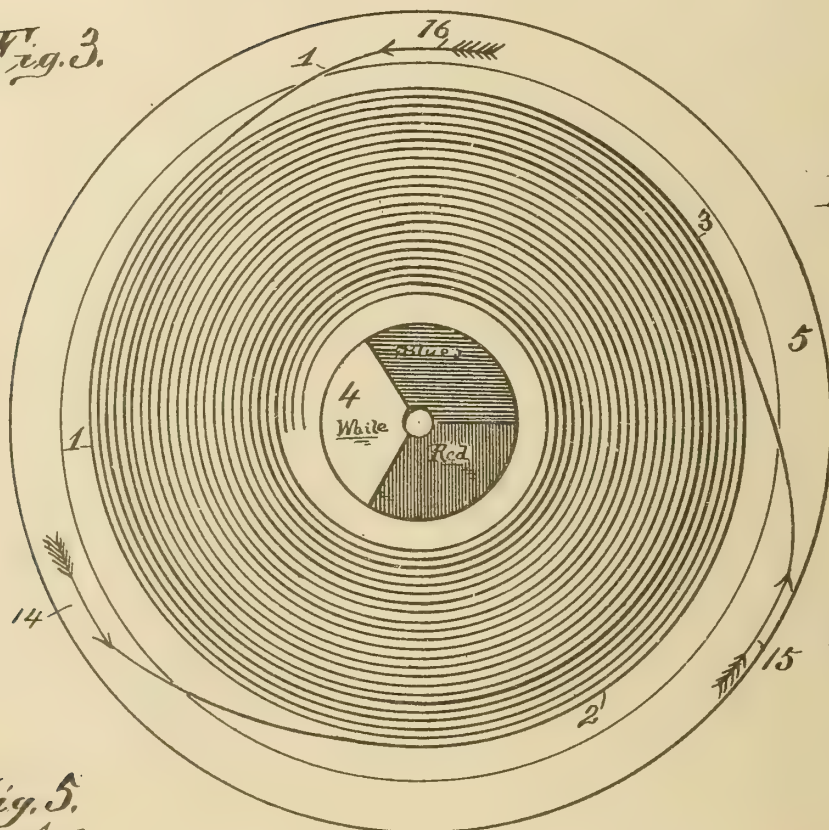


Fig. 4.



Fig. 5.

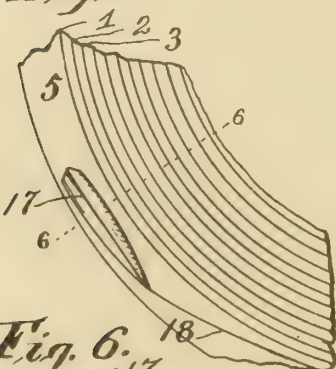


Fig. 6.

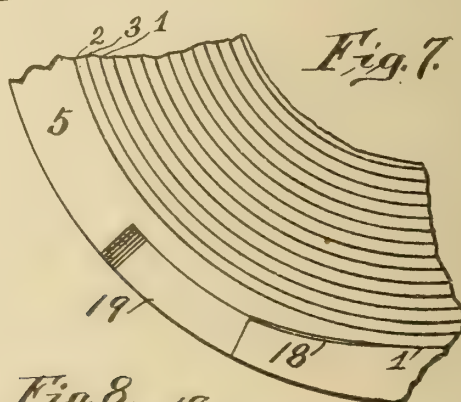
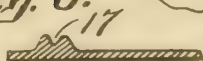


Fig. 7.

Fig. 8.



Inventor

Witnesses
 Thos. W. Mumford
 L. E. Stettin

Edgar M. Berliner,
 By Eugene W. Johnson,
 Attorney

UNITED STATES PATENT OFFICE.

EDGAR M. BERLINER, OF WASHINGTON, DISTRICT OF COLUMBIA.

RECORD FOR SOUND-REPRODUCING MACHINES.

936,976.

Specification of Letters Patent.

Patented Oct. 12, 1909.

Application filed October 3, 1908. Serial No. 456,062.

To all whom it may concern:

Be it known that I, EDGAR M. BERLINER, a citizen of the United States, and a resident of Washington, in the District of Columbia, have invented certain new and useful Improvements in Records for Sound-Reproducing Machines, of which the following is a specification.

This invention appertains to improvements in record disks and cylinders for sound reproducing machines, the purpose of the invention being to provide sound records with a plurality of sound grooves and to provide each groove with perceptible means for indicating where the style or needle should be placed to enter a particular sound groove or record track, the means being of such a character that the operator may distinguish, either by sight or by touch the position where the style or needle is to be placed in order that any one of the several selections on the record may be distinguished and played.

Prior to my invention it has been proposed to make records having a sound groove which is paralleled by a second sound groove, the same being known as a "puzzle record", for the reason that the operator would not know and could not determine which of the two records on the disk or cylinder would be played, and it is also old in the art to provide a record, having a single selection thereon, with an indented line or mark at the beginning or start of the sound groove, for the purpose of guiding the style or needle of the reproducer into the groove, such line or mark being so minute that it is not perceptible to the touch, nor of such a character that it may be readily distinguished by sight. My improvement is readily differentiated from such records as a multilineal record made in accord with my invention has thereon indicating means, whereby the operator may distinguish one groove or selection from another and so place the style or needle that it will enter a particular sound groove and reproduce the chosen selection, and in carrying my invention into practice, the perceptible means for distinguishing one sound groove or selection from another are differently colored and spaced and they are also positioned either above or below the plane of the sound grooves.

In the drawings Figure 1 is a plan view of a disk record made in accord with my in-

vention, the perceptible indicating means being within the space occupied by the sound grooves and positioned concentric to the center of the disk. Fig. 2 is a transverse section on the line *a-b*, of Fig. 1. Fig. 3 is a plan view of another form of my invention, the center of the disk being colored, and with this form of my invention the outer border will have raised indicators formed thereon. Fig. 4 is a side elevation of a part of the disk shown by Fig. 3. Fig. 5 is a fragmentary plan view of a further modification. Fig. 6 is a section on the line 6-6. Fig. 7 is a fragmentary plan view of another modification, and Fig. 8 is a side elevation of the construction shown by Fig. 7.

Referring to the drawings 1, 2, and 3 indicate the sound grooves of the record, such grooves being spiral and parallel, and in practice the inner and the outer margins 4 and 5, may be raised or above the plane of the face of the disk into which the sound grooves are impressed. The margins or "dead spaces" 4 and 5 are the portions of the disk or record upon which I apply the perceptible indicating means, each sound groove or selection having an indicator which differs as to position or appearance from the others.

Upon Fig. 1 of the drawings, the disk record is provided with sound grooves 1, 2, and 3 and upon the inner margin or dead space 4 of the disk I provide raised and differently colored indicating means 11, 12, and 13 they being concentric to the axis of rotation of the disk. The raised indicator 11 may be colored blue and is positioned relative to the commencement of the sound groove 1, so that the operator may place the style or needle upon the "dead space" to enter such groove and reproduce the selection recorded by such groove. The indicator 12 may be white, and the third one may be red. It will be observed that the indicators are out of line and being near the center of the disk, where the speed is the lowest, they may be readily seen when the disk is in motion, and if the style is placed upon the segment projected from the ends of the indicators it will enter the selected sound groove. By having the several indicators raised an operator may be able to distinguish in the dark, by his sense of touch, for the indicators are spaced apart and out of line relative to the axis of rotation of the disk. The disk shown by Fig. 1 may have a raised outer

border or margin, the surface thereof being on the same plane as the upper surface of the indicators 11, 12 and 13.

Fig. 3 shows a further form of my invention in which the center portion of the disk is colored, and upon the outer border 5 are raised portions 14, 15 and 16, one for each of the sound grooves. The raised portions 14, 15 and 16 are concentric to the center of the disk and are adapted to guide the style or needle to a groove that joins the sound groove. If desired the raised portions may be colored to correspond with the color in radial line therewith.

Fig. 5 shows another modification, and in this form of my invention the projecting portion has a longitudinal groove or recess 17 that guides the style to the groove 18 that joins one of the sound grooves, and each disk will be provided with as many of these raised portions as there are sound grooves or selections upon the disk, and the groove or recess 17 may be colored.

Fig. 7 shows a further modification of the invention, and in this example of my improvement, the border of the disk is cut away to provide depressions 19, the same having longitudinal and inward inclined bottom surfaces to lead the style or needle to a guide groove 18, and the bottom of the recesses may be colored by being painted or otherwise.

In practice the center space of the disk not occupied by the indicating means will carry a label having marks corresponding with marks or other indicia placed adjacent to the indicating means, set forth, and the indicating means are on a different plane from the surface of the "dead space" of the disk and are preferably located to be out of line in the direction of the travel of the disk, and by means of the invention set forth the record disk is provided with a plurality of indicators which will be perceptible to the touch and sight, and enables the operator to place the style or needle to play the desired selection or groove of the record in the dark.

My invention may be readily applied to sound record disks in which the sound grooves progress spirally outwardly, as shown in Patent No. 785,191 issued to Herbert S. Berliner, March 21, 1905.

I claim.

1. A sound record having thereon several different selections and means on different points of the record said means being perceptible to the eye and to the touch for indicating where the reproducing style is to be placed to enter a particular sound groove each of said indicating means being located at different points longitudinally of the record.

2. A sound record having a plurality of sound grooves and a like number of radially and circumferentially differently located

means upon the record for indicating where the reproducing style is to be placed to enter a particular sound groove.

3. A sound record having thereon a plurality of parallel sound grooves and a plurality of perceptible radially and circumferentially differently positioned means placed relative to each of the sound grooves for indicating where the reproducing style is to be placed to enter a particular sound groove.

4. A sound record having a plurality of substantially parallel sound grooves, perceptible indicating means upon the record each of which leads to a particular groove; the indicating means being located longitudinally out of line one with the other.

5. A sound record consisting of two or more sound grooves which are substantially spiral and parallel, perceptible means corresponding in number with the sound grooves; the same being located adjacent to the commencement of and out of line longitudinally one with the other each of said means leading to particular sound grooves.

6. A sound record having a plurality of grooves and provided with a plurality of indicating points positioned out of line with the plane of the grooves, for the purpose set forth.

7. A sound record having a plurality of sound grooves and provided with a plurality of indicating means positioned out of line with the plane of the grooves, each of the indicating means having a recess for directing the style of the reproducer to a particular groove, for the purpose set forth.

8. A sound record having a plurality of sound grooves and a plurality of marginally located indicating means positioned to be concentric to the axis of rotation of the record and above the plane of the record, for the purpose set forth.

9. A sound record consisting of two or more sound grooves and means perceptible to sight and touch for indicating the placing of a style of a reproducer: such means being provided with recesses for leading the style to a particular sound groove.

10. A sound record having two sound grooves which lie one within the other the starting points of each of the grooves being on radially different lines.

11. A sound record having thereon a plurality of substantially parallel sound grooves, each particular sound groove beginning at a point which is radially different from the point of commencement of another sound groove.

12. A sound record consisting of a plurality of substantially parallel sound grooves, each sound groove beginning at a point that is out of line longitudinally with the point of commencement of another sound groove.

13. A sound record having a plurality of

longitudinally parallel sound grooves each particular groove commencing at radially different points which are longitudinally out of line.

5 14. A sound record having two substantially continuous and parallel sound grooves which commence at points which differ circumferentially.

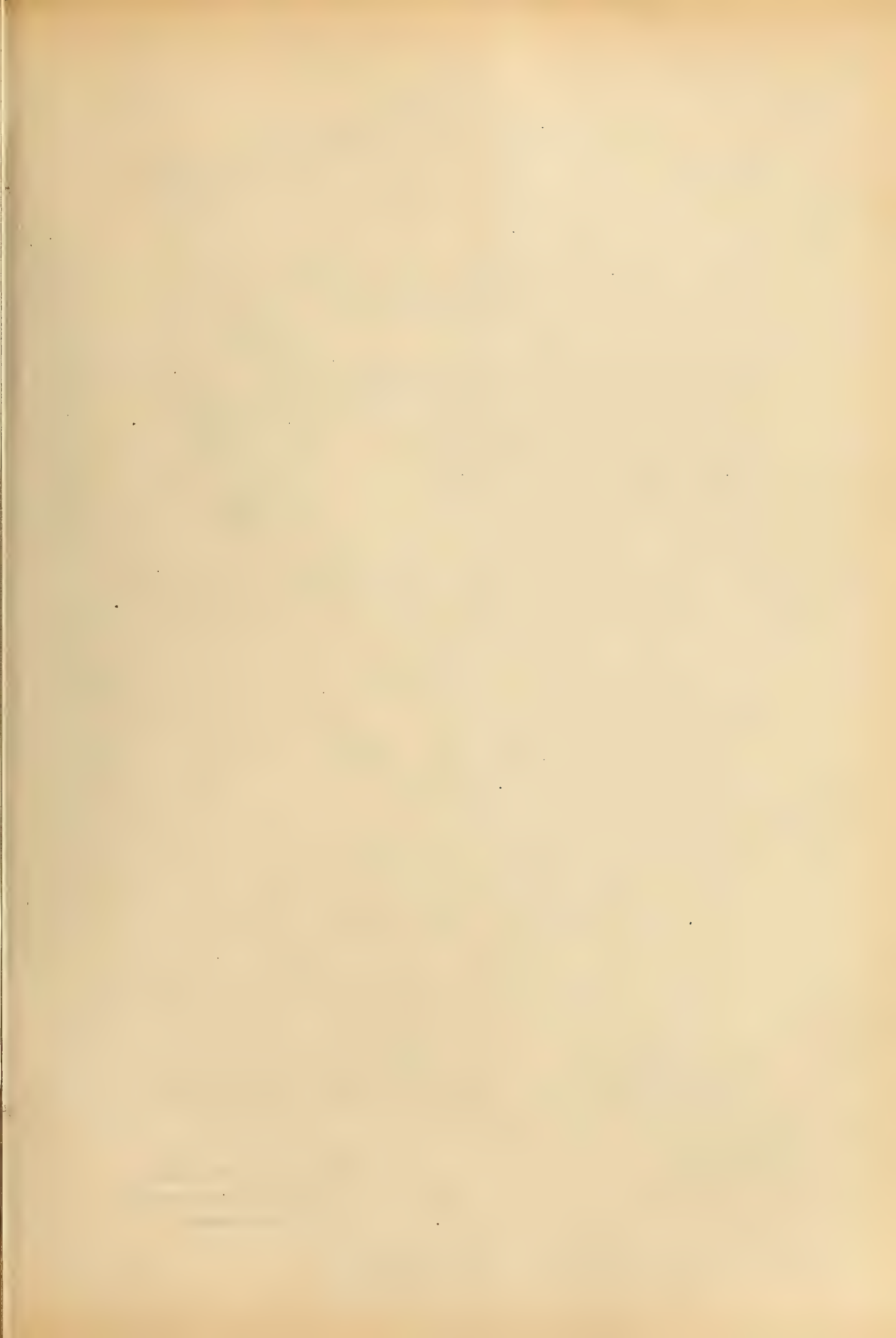
15. A sound record having different sound grooves therein each sound groove commencing at a point that is out of line with the commencing point of the other sound groove.

EDGAR M. BERLINER.

Witnesses:

EUGENE W. JOHNSON.

H. B. STRAIT.



F. F. MURDOCK.
SPEED CHANGING MECHANISM FOR GRAPHOPHONES.
APPLICATION FILED JAN. 25, 1909.

937,459.

Patented Oct. 19, 1909.

2 SHEETS—SHEET 1.

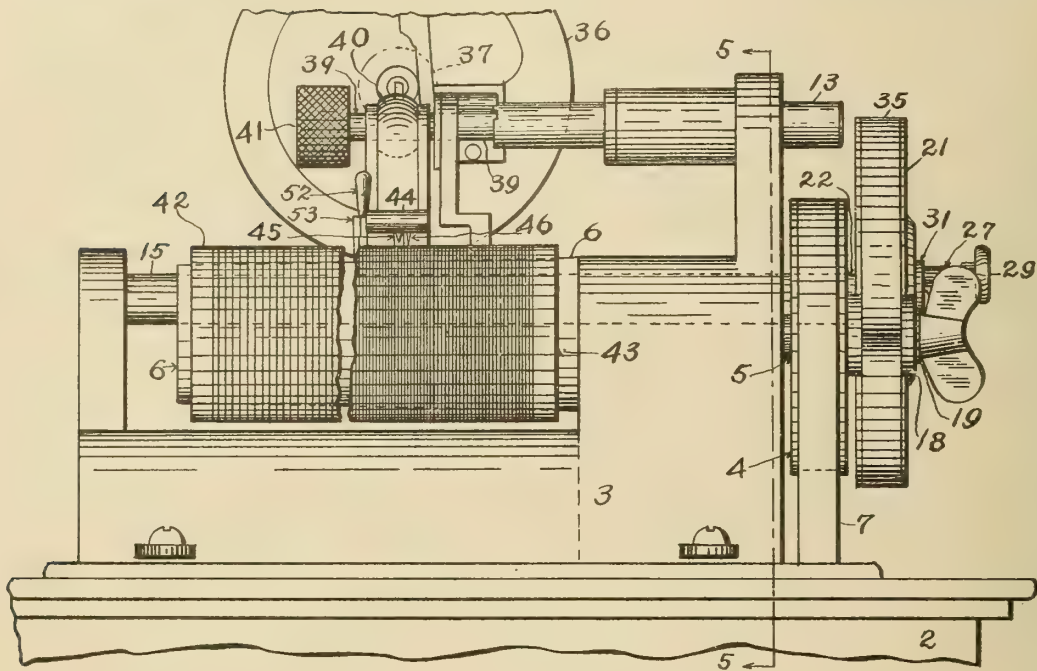


Fig. 1.

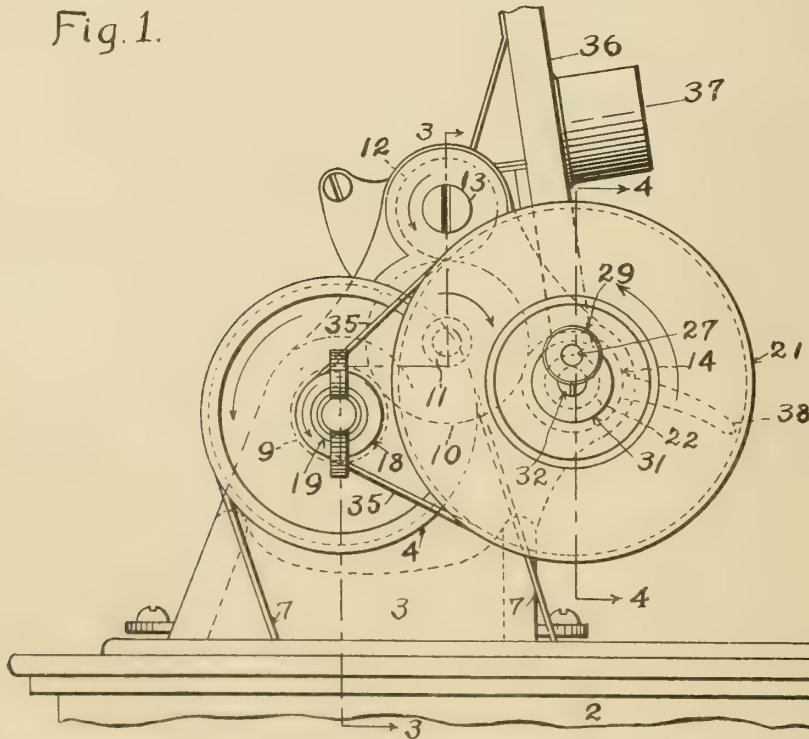


Fig. 2.

Witnesses:

C. W. Hill
R. L. Wallace

Inventor:

Frederick F. Murdock.
By *Harry De Wallace*
Attorney.

F. F. MURDOCK.
SPEED CHANGING MECHANISM FOR GRAPHOPHONES.
APPLICATION FILED JAN. 25, 1909.

937,459.

Patented Oct. 19, 1909.

2 SHEETS—SHEET 2.

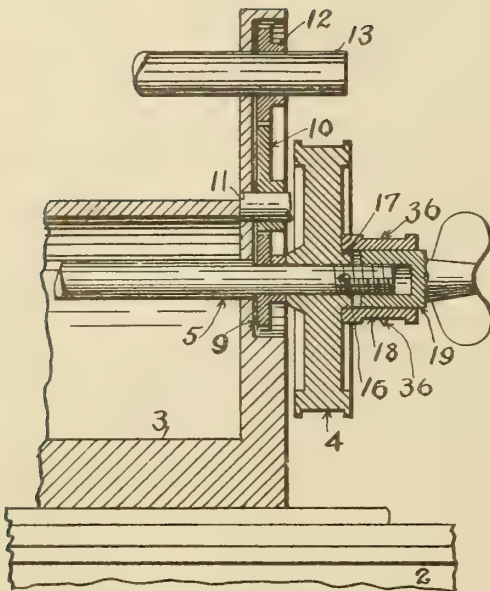


Fig. 3.

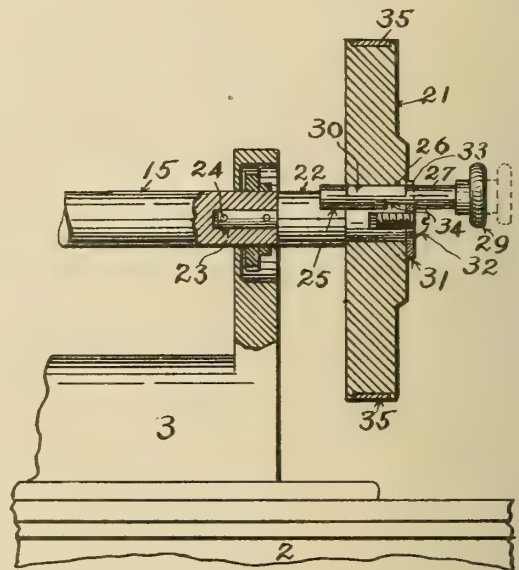


Fig. 4.

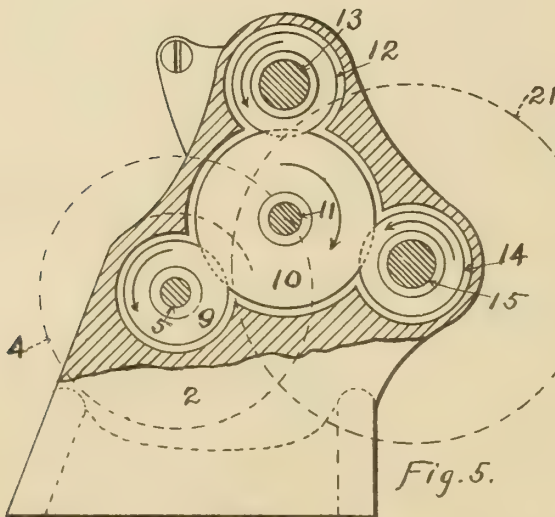


Fig. 5.

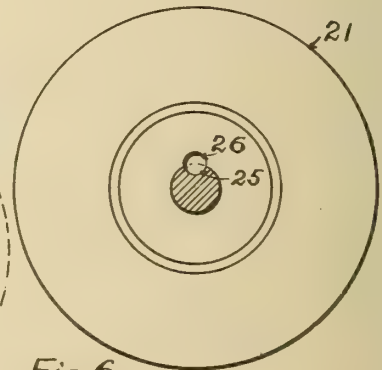


Fig. 6.

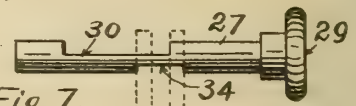


Fig. 7.

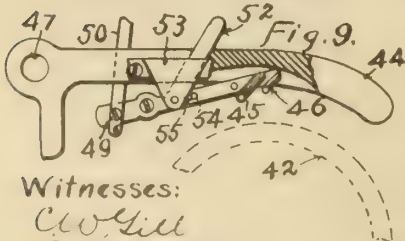


Fig. 9.

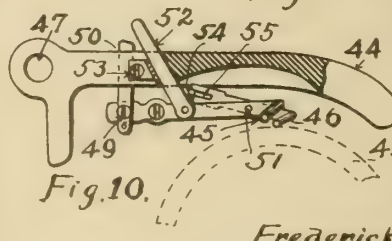


Fig. 10.

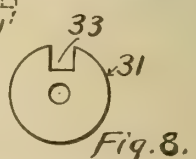


Fig. 8.

Witnesses:
C. W. Gill
R. L. Wallace

Inventor:
Frederick F. Murdock.
By Harry D. Wallace
Attorney.

UNITED STATES PATENT OFFICE.

FREDERICK F. MURDOCK, OF SYRACUSE, NEW YORK.

SPEED-CHANGING MECHANISM FOR GRAPHOPHONES.

937,459.

Specification of Letters Patent.

Patented Oct. 19, 1909.

Application filed January 25, 1909. Serial No. 473,963.

To all whom it may concern:

Be it known that I, FREDERICK F. MURDOCK, a citizen of the United States, residing at Syracuse, in the county of Onondaga and State of New York, have invented certain new and useful Improvements in Speed-Changing Mechanism for Graphophones, of which the following is a specification.

This invention relates to improvements in speed changing mechanism for graphophones, and has for its object to provide an additional attachment or mechanism, by means of which both the old and the new machines may be readily adapted to play what is commonly called the standard two minute record, and also a new four minute record which has but recently been produced.

Heretofore the Columbia, Edison and other talking machines have been constructed and geared to play the standard two minute cylindrical records. These records are all about the same length, and have a certain threading, and the driving and feed mechanisms are arranged to rotate the record, and carry the reproducing parts along and play each record in about two minutes. Most of the machines in existence at the present time, so far as known, are built and geared for playing the two minute records. The records produced by the different manufacturers being, for the most part, threaded the same, are interchangeable. Recently a new record has been brought out for use on the phonographs, and this record is more compact, and more finely threaded, and requires four or five minutes to play the same, which is about double the length and time required to play the old record. Owing to the fineness of the threading, the long records cannot be reproduced by the mechanisms which are constructed to play the shorter and coarser records.

It is a particular object of this invention to provide the necessary attachments or parts, by means of which the speed of the old reproducing mechanism may be properly reduced, and the feeding of said parts readjusted, so as to adapt the graphophones for playing the new style of record, the same as the other makes of talking machines are able to do.

The present invention consists of a reduction gearing comprising a large and a small pulley, which are operatively connected by a belt, the smaller pulley being mounted on the old record driving pulley; the larger

pulley being mounted upon the shaft which carries the sound box and other reproducing parts.

The invention further consists of a simple clutch mechanism and coöperating parts, by means of which the machine may be adjusted and set in a ready manner for playing either the long or the short records without requiring any alteration of the machine.

The invention further consists of adjustably arranging two reproducing needles, one coarse and the other fine, by means of which either of the said records may be played without requiring the removal or replacing of the needles or any of the reproducing parts.

The invention further consists of the features and combinations of parts set forth in the detail description which follows, reference being had to the accompanying drawings which form a part of this specification, and in which—

Figure 1 is a side elevation of a graphophone, showing the disposition and arrangement of the principal parts of my improvement; also showing portions of the old and the new records. Fig. 2 is a front end elevation of the machine. Fig. 3 is a sectional view substantially on line 3—3 of Fig. 2. Fig. 4 is a sectional view substantially on line 4—4 of Fig. 2. Fig. 5 is a sectional view substantially on line 5—5 of Fig. 1. Fig. 6 is a detail view of the large auxiliary pulley. Fig. 7 is an enlarged view of the clutch key. Fig. 8 is an enlarged detail view of the plate which holds the large pulley in place and also coöperates with the clutch key. Fig. 9 is an enlarged detail view of the needle support, showing the coarse and fine needles pivotally connected, and disposed in rest position. Fig. 10 is a similar view, showing the fine needle in engagement with the new record, the same being shifted and held in such position by the reversing of the operating lever.

In the accompanying drawings, 2 represents the case or box in which a spring motor or other mechanism for driving a graphophone is disposed.

3 represents the body of the machine which is mounted on the top of the case or box 2.

4 represents a pulley mounted upon a shaft 5, the latter being journaled in the body 3, on the opposite end of which is

mounted a tapering cylinder 6 which carries the records. Pulley 4 is driven by a belt 7 which passes downwardly into the case and connects with the motor or other source of power. In a cavity in the front of body 2 is disposed a spur gear 9, which is also mounted on the shaft 5, and meshes with the idler gear 10 mounted on a shaft 11 supported by the body 2. Gear 10 meshes with a third gear 12 which is mounted upon what is called the "amber" shaft 13; the latter shaft being extensible, as shown in Fig. 1, the inner end supporting certain of the reproducing parts. The idler gear 10 also meshes with a fourth gear 14 which is mounted upon a feed shaft 15, which supports and carries the sound box, needles, horn and other parts.

On all of the old graphophones, so far as known to me, the outer end of shaft 5 is threaded and projects beyond the record pulley 4, to which a nut (not shown) is applied and employed for holding the inner hub of pulley 4 tightly against gear 9, and by this means the said gear is rotated with said pulley and shaft. In the old machines the nut referred to, is always maintained in its tightened position, except when the machine is being taken apart. In the present invention the old nut referred to is removed from shaft 5 and other parts substituted, which will now be described. A sleeve pulley 18 is rigidly secured to the hub 17 of pulley 4 by a pin 16, which latter also secures the pulley 4 to shaft 5. Pulley 18 is bored out to uniform diameter to receive the body of a cylindrical thumb-nut 19, which in turn is bored out and internally threaded for engagement with the threaded end of shaft 5. Under this construction the nut 19 may be screwed inwardly, at the will of the operator, for forcing pulley 4 against the gear 9, for the purpose of driving said gear and the several other gears connected therewith, and thereby effect the driving and feeding of the machine for playing the old two minute record. When nut 19 is screwed in tight, the machine will operate normally as heretofore. When thumb-nut 19 is unscrewed away from the hub of pulley 4 (see Fig. 3), the tension between pulley 4 and gear 9 is relaxed sufficiently to allow shaft 5 to turn freely in said gear. Under this arrangement gears 9, 10, 12 and 14 will remain stationary, unless otherwise driven, while pulley 4 and shaft 5 may be rotated independently by the belt 7.

To further carry out the object of the present invention, I provide a large pulley 21 which is mounted upon an extension 22 of the shaft 15. The extension 22 is connected to shaft 15 by means of a tenon 23 and a pin 24. The outer end of the extension 22 is slightly reduced to form a journal to receive pulley 21. At one side of the

journal of shaft 22, a semi-circular slot or groove 25 is cut, which extends inwardly a short distance beyond the inner face of pulley 21. At one side of the bore of pulley 21 a similar slot 26 is formed, and these two slots when brought into register form a circular key-way or opening to receive an adjustable clutch pin or key 27, which is provided at its outer end with a handle or knob 29. Key 27 is notched or cut-away at 30, and this notch has a length equal to the thickness of pulley 21, and a depth substantially one-half the diameter of the key. Under this construction when clutch key 27 is disposed, as shown in full lines in Fig. 4, pulley 21 may be rotated on shaft 22 as an idler. When, however, key 27 is drawn outwardly to the position shown by dotted lines in Fig. 4, the inner end of the key will be drawn into the pulley, and owing to the arrangement of the ways or grooves 25 and 26, key 27 will then affect the driving of shaft 15—22 when pulley 21 is operated. Pulley 21 is held in place by a cap or plate 31 which is perforated centrally to receive a screw 32, which is threaded into the end of shaft 22. Cap 31 is notched at one side, as at 33, to receive the clutch key 27.

34 represents a notch cut in the under side of key 27, which is employed in connection with cap 31 for limiting the longitudinal movement of the key, as shown in Figs. 4 and 7. The bottom of the notch in plate 31 being cut at right angles to its sides, and the underside of key 27 being rendered flat by the notch 34, serves to prevent the key from being rotated, and limits the same to longitudinal movement only, to the extent of the length of notch 34. Under this arrangement the clutch key is normally held, with relation to the pulley 21, in the positions shown in Fig. 4. Pulley 21 is driven by a belt 35 which connects said pulley with the small pulley 18. Pulley 18 having a much smaller diameter as compared with pulley 21, a series of pointed spikes are placed at intervals in the circumference of the small pulley, in order to prevent the belt from slipping. By this latter provision pulley 21 will be rotated in a positive manner, and through its connection with pulley 18, the large pulley will always be driven in the same direction as the old pulley 4 as indicated by the darts in Fig. 2. This construction is necessary in order that the record operating and the feed mechanism for the reproducing parts may be operated in the same direction at all times as heretofore, whether the old two minute records with their coarse threading which requires rapid feeding be played, or whether the four minute records with their finer threading and which require slower feeding are being played.

36 represents the usual sound box, which

is provided with a rearwardly extending hub 37 to which the horn (not shown) may be attached. The sound box is mounted upon the shaft 15, and is carried along on said shaft when the machine is in operation and playing by the well known mechanism. The sound box is adjustable by hand in either direction along said shaft by means of a lever 38.

39 represents an extension of the shaft 12 which supports an amber wheel 40 forming a part of the reproducing parts, and its outer end is fitted with an adjustable weight 41.

42 illustrates a portion of an old two minute record mounted in operative position upon the cylinder 6 and having a coarse or rapid threading, as shown in Fig. 1.

43 illustrates a part of the new four minute record referred to, also mounted upon cylinder 6, upon which is shown a fine or slow threading, as compared with the old record 42. In practice the record 43 is provided with about double the number of threads as the old record.

44 represents an adjustable support for the reproducing needles 45 and 46. The part 44 is pivotally mounted in the machine by means of a perforation 47 formed in its rear end. Needle 45 is the coarser of the two, and is the same as employed on the old style graphophones for playing the two minute record. This needle is provided with a long shank which is pivoted at 49 to a bar 50, the upper end of which engages the amber wheel in the usual manner. Needle 46 is finer than the old needle, and is constructed expressly for the more finely threaded four minute record. The needles for the different sized records cannot be used interchangeably. Needle 46 is pivotally joined to the side of needle 45 at 51, and is capable of being tilted to different positions, as shown in Figs. 9 and 10 by means of a lever 52, which is pivoted to a hanger 53 mounted on the edge of support 44. Lever 52 is provided with a crank-like rod 54, the inner end of which engages a slot 55 formed in the inner end of needle 46. The arrangement of the lever and its crank are such that when the lever is thrown forward the two needles are brought together in line with each other, as shown in Fig. 9, at which time the coarse needle 45 may be lowered so as to engage the old record 42, and at the same time the finer needle 46 will be held out of engagement with said record. When new record 43 is to be played, the operator should reverse lever 52 to the position shown in Fig. 10, at which time crank 54 will tilt needle 46 and throw its point downwardly below the point of needle 45, in position to engage the finely threaded record 43, as shown in Figs. 1 and 10. Under this construction and arrangement either the long or short record may be played, and the

needles may be adjusted in a moment's time by simply shifting lever 52 as described.

To operate a graphophone having my improvement applied, for the purpose of playing the new long record, the operator should first unscrew thumb-nut 19, so as to break the driving connection between pulley 4 and gear 9. By this means the belt 7 which communicates the power from the motor to pulley 4 for driving the entire machine through the several gears, will operate only pulley 4 and shaft 5 directly. The operator should next pull out the clutch key to the position shown by dotted lines in Fig. 4, so as to connect pulley 21 to shaft 22 for driving the same, through belt 35, and sleeve pulley 18, which is carried by the pulley 4. Under this arrangement and adjustment pulley 21, through its connection with shaft 15 and gear 14, becomes the direct driver for gear 14 and also for the other gears, instead of pulley 4 and gear 9. In order to properly operate the machine for playing the finely threaded four minute record, the speed of the record as well as that of the reproducing parts must be reduced approximately one-half, because the threading of the new record is about twice as fine as the old record. The slowing up of the record and the feed driving mechanism is accomplished by the relative difference between the diameters of the pulleys 18 and 21. To change a machine back to the condition for playing the old two minute record, which requires the same speed for the record but double the speed for the reproducing parts, the operator should shift the clutch key to the position shown by full lines in Fig. 4, and then screw in thumb-nut 19 until it forces and holds pulley 4 tightly against gear 9. Under this adjustment, pulley 4 becomes the driver again for all of the gears, and pulley 21 rotates idly upon shaft 22.

It will be seen from the foregoing description when read in connection with the drawings, that my speed changing mechanism may be readily applied to the Columbia graphophones as they are constructed and operated at the present time, as well as to new machines of the class, and that the new attachment, while rendering the machine more valuable and serviceable, in no way interferes with the carrying out of the original and popular functions of the devices.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is—

1. The combination with a graphophone having a record supporting and operating mechanism and a mechanism for feeding the reproducing parts, the said mechanisms being geared for playing the small standard "Columbia" and "Edison" records, of a reduction gearing comprising a small and a large pulley connected with the record and

the reproducing mechanisms respectively, the said pulleys capable of adapting said machine for playing a long record, the difference in the diameters of said pulleys being sufficient to reduce the speed of the reproducing mechanism, while the long record is being played, while the speed of the record operating mechanism remains normal, a belt to connect said pulleys, a clutch carried by one of said pulleys adapted for making or breaking the operative connection between said pulley and said feeding mechanism, and means coöperating with said clutch for adjusting the speed of the said mechanisms for playing either a long or a standard record.

2. The combination with a graphophone geared for playing so-called standard two minute records, of a reduction gearing operatively connected with said machine, comprising a pair of pulleys of unequal diameters, capable of adapting said machine for playing four minute records, the difference in the diameters of said pulleys being sufficient to reduce the speed of the feed mechanism for the reproducing parts of said machine approximately fifty per cent., while the speed of the record driving mechanism remains normal, a belt to connect said pulleys, a clutch-key carried by one of said pulleys adapted for controlling the operative connection between said pulley and the feeding mechanism, and a thumb-nut disposed in the smaller pulley adapted to coöperate with said clutch-key for increasing or diminishing the speed of said feeding mechanism.

3. In a graphophone, the combination with a record and an operating mechanism therefor, and a reproducing needle and a feed mechanism therefor, the said mechanisms being normally geared for playing the standard "two minute" records, of a pair of pulleys of unequal size, one carried by said record operating mechanism, the other carried by said feed mechanism, the relative difference in the size of said pulleys being sufficient to effect the reducing of the speed of travel of the needle approximately one-half, thereby to adapt said machine for playing a four minute record, a belt to operatively connect said pulleys, a train of gears to connect the said mechanisms, means for driving said train of gears directly by the power which operates the record, and means for driving said train of gears indirectly through said pulleys and said belt, for playing the four minute record.

4. In a graphophone, the combination with a record and an operating mechanism therefor, and a reproducing needle and a feed mechanism therefor, the said mechanism being normally geared for playing standard "two minute" records, of a pair of pulleys of unequal size, one carried by

said record operating mechanism, the other carried by said feed mechanism, the relative difference in the size of said pulleys being sufficient to reduce the speed of travel of the needle approximately one-half, thereby to adapt said machine for playing a four minute record, a belt to operatively connect said pulleys, a clutch key carried by one of said pulleys and a nut carried by said record operating mechanism, adapted for reversing the driving and thereby changing the speed of said feed mechanism for playing records of different length.

5. A speed changing gearing for graphophones, comprising a pair of pulleys of unequal size, one of said pulleys carried by the record operating parts of the machine, the other pulley carried by the reproducing parts of the machine, the said pulleys being arranged so that the smaller drives the larger pulley, thereby to reduce the normal speed of the reproducing parts, a belt to operatively connect said pulleys, a clutch to control the operative connection between the large pulley and the reproducing parts, and means coöperating with said clutch for changing the speed of the reproducing parts from normal to a lower speed and vice versa.

6. A speed changing attachment for graphophones, comprising a pair of pulleys of unequal diameter operatively connected by a belt, one of said pulleys carried by the record operating parts, the other pulley carried by the reproducing parts of the machine, the said pulleys being arranged so that the smaller drives the larger thereby to reduce the normal speed of the reproducing parts, a clutch carried by the larger pulley adapted to control the operative connection between said pulley and the reproducing parts, and means for changing the speed of the reproducing parts from normal to a lower speed and vice versa.

7. A graphophone having a shaft adapted for carrying records of different length, and a shaft for carrying and feeding the reproducing parts, and having a train of gears connecting the said shafts, one of said gears mounted loosely on the record shaft, and one of said gears mounted rigidly on the feeding shaft, an extension rigidly mounted on one end of said feeding shaft, a pulley for driving said record shaft, a source of power, a belt connecting said source of power with said record pulley, a reduction gearing comprising a small pulley rigidly secured to said record pulley, and a large pulley journaled on the extension of said feeding shaft, a nut mounted on the end of said record shaft adapted for frictionally connecting said record pulley with the gear carried by said shaft, for the purpose of driving said train of gears at a given speed when the machine

is playing a short record, the said nut also adapted for breaking the driving connection between said record pulley and said train of gears, and a clutch key carried by the extension of said feeding shaft, adapted for rigidly connecting said large pulley to said shaft, for the purpose of driving said train of gears at a reduced speed when the machine is playing a long record, the said clutch capable of being operated for releasing said large pulley and allowing the same to rotate idly upon said feeding shaft.

8. A graphophone having a record bearing and operating shaft, and a pulley for driving said shaft, and having a train of gears for operating the reproduction parts, one of said gears being mounted upon the record shaft, and a second gear being mounted upon a feeding shaft, in combination with said record pulley, of a reduction gearing comprising a small pulley rigidly attached to said record pulley, and a large pulley journaled on said feeding shaft, a belt to operatively connect said large and said small pulley, a thumb-nut mounted in the record shaft within said small pulley and capable of forcing and holding said record pulley tightly against the gear carried by said shaft, for driving said train of gears at a certain speed for playing a short record, said nut capable of being unscrewed for the purpose of breaking the driving connection between the record pulley and said train of gears, and a clutch carried by said large pulley, adapted to connect said pulley with the feeding shaft, thereby to drive said train of gears at a lower speed for playing a long record, when said thumb-nut is unscrewed, the said clutch also adapted to disconnect said large pulley from the feeding shaft for allowing the same to rotate idly on said shaft, during the interval in which the record pulley may

be connected for driving said train of gears by the tightening of said thumb-nut. 45

9. An attachment for reducing the speed of the reproducing parts of a graphophone, comprising a small pulley and a large pulley, operatively carried by the machine, a belt to connect said pulleys, a clutch carried by one of said pulleys, and a nut capable of cooperating with said clutch for positively connecting said pulleys with, and for driving the reproducing parts of a graphophone, in slower time than the normal speed of the said parts, thereby to adapt the machine for playing four instead of two minute records. 50 55

10. A speed reducing mechanism for graphophones, comprising a large and a small pulley operatively connected by a belt, one of said pulleys rigidly connected to a moving member of the machine positively driven by the power employed for operating the machine, the said member being always operated in the same direction at the same speed, the other pulley being adjustably connected to a feed shaft, employed for supporting and feeding the reproducing parts of the machine, by means of an extension to said shaft, a clutch adapted for connecting the last named pulley to said shaft in a manner to effect the positive driving of said shaft at a lower speed than when operated by said moving member, the said clutch being arranged to permit said pulley to rotate idly upon said shaft, for the purpose of allowing the machine to operate at its normal speed, and a nut adapted to cooperate with said clutch for effecting the change of the speed of the machine. 60 65 70 75 80

In testimony whereof I affix my signature in presence of two witnesses.

FREDERICK F. MURDOCK.

Witnesses:

WM. C. ANDERSON,
HARRY DE WALLACE.



3 SHEETS—SHEET 1.



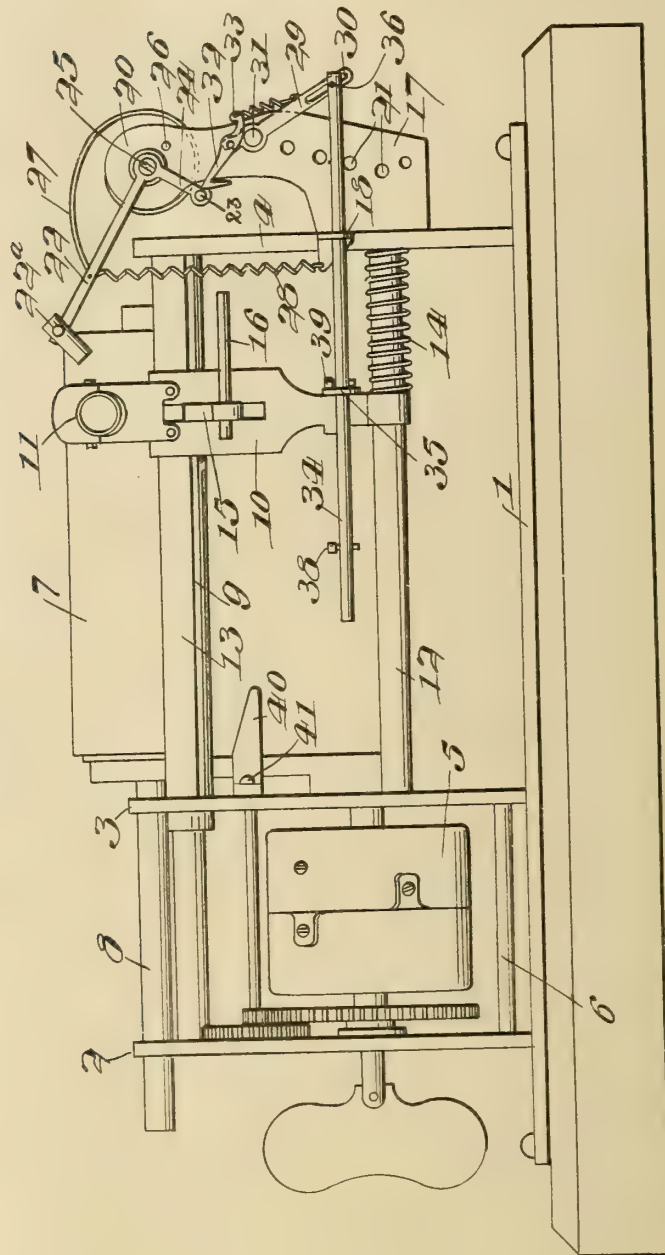
Attorneys

G. F. PERRENOT.
ATTACHMENT FOR PHONOGRAPHS, &c.
APPLICATION FILED DEC. 26, 1908.

Patented Oct. 19, 1909.
3 SHEETS—SHEET 2.

937,641.

Fig. 2.



Witnesses
C. D. Brown.
C. H. Giesbauer

Inventor
Geo. F. Perrenot,
By *A. B. Wilson & Co*
Attorneys

G. F. PERRENOT.
ATTACHMENT FOR PHONOGRAPHS, &c.
APPLICATION FILED DEC. 26, 1908.

937,641.

Patented Oct. 19, 1909.
3 SHEETS—SHEET 3.

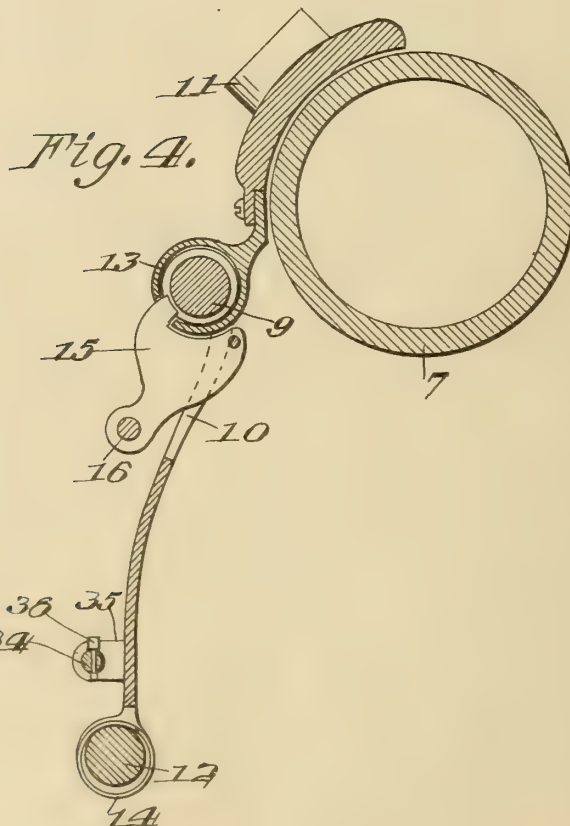
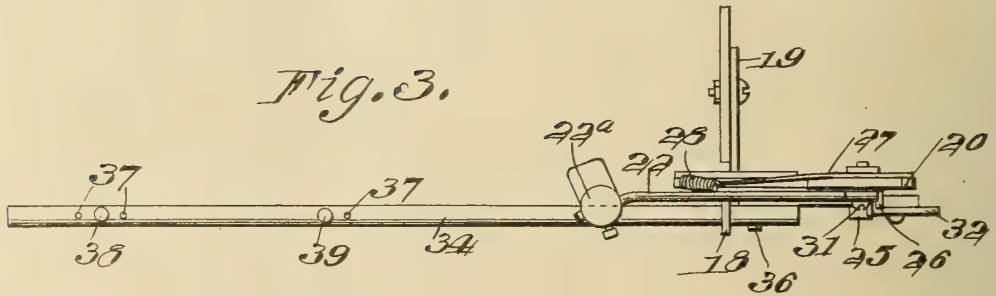
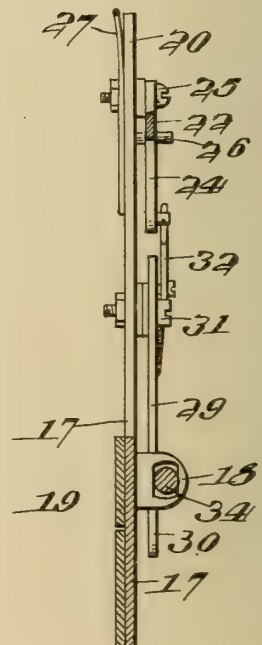


Fig. 5.



Witnesses
E. D. & J. Brown.
C. H. Giesbauer

Inventor
Geo. F. Perrenot,
By *A. B. Wilson & Co.*
Attorneys

UNITED STATES PATENT OFFICE.

GEORGE F. PERRENOT, OF YOAKUM, TEXAS, ASSIGNOR OF ONE-FOURTH TO ROBERT WILLIAM EASTERLING, OF YOAKUM, TEXAS.

ATTACHMENT FOR PHONOGRAPHS, &c.

937,641.

Specification of Letters Patent.

Patented Oct. 19, 1909.

Application filed December 26, 1908. Serial No. 469,213.

To all whom it may concern:

Be it known that I, GEORGE F. PERRENOT, a citizen of the United States, residing at Yoakum, in the county of Dewitt and State of Texas, have invented certain new and useful Improvements in Attachments for Phonographs, Graphophones, &c.; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention comprehends the construction of a repeating device for phonographs or graphophones capable of returning a reproducer of a phonograph to its starting position on a record.

One of the objects of this invention is the construction of a repeating device for phonographs which may be cheaply manufactured, and readily applied to cylindrical machines.

Another object of this invention is the construction of a phonographic repeating device capable of being automatically operated by the reproducer moving arm of a phonograph.

Another object of this invention is to provide a phonograph with means for returning a reproducer to its starting position and to automatically hold the reproducer out of engagement with its driving shaft.

With these and other objects in view this invention comprises certain novel constructions, combinations and arrangements of parts, illustrated in the accompanying drawings and particularly described in the specification and claims.

In the drawings and specifications similar parts are referred to by like numerals, in which,

Figure 1 is a side elevation showing my improved mechanism in its normal position; Fig. 2 is a side elevation showing my improved mechanism in a raised position; Fig. 3 is a plan view; Fig. 4 is a transverse section taken on line 4-4 of Fig. 1, and, Fig. 5 is a detail vertical sectional view taken on line 5-5 of Fig. 1.

In the drawings, I have illustrated a cylindrical phonographic machine comprising a base plate 1, on which are positioned a plurality of standard plates 2, 3 and 4. The standard plates 2 and 3 support a driving mechanism 5, and are secured in place in any suitable manner, in this instance by

horizontal rods 6. The usual shafts for the record and the reproducer are mounted on the standard plates. A cylindrical record 7 rotates on a record shaft 8, and a threaded shaft or worm 9 having connections with the driving mechanism connects with a reproducer arm 10, said arm carrying a reproducer 11. The arm 10 is slidably mounted on two horizontal rods 12 and 13, and the rod 12 is provided with a spring 14 which exerts tension against arm 10.

The arm 10 is provided with a movable half nut 15 arranged to engage the threaded shaft 9, and said nut is provided with a pin 16 which extends laterally therefrom. When the nut 15 engages the threaded shaft 9, the reproducer 11 will be moved across the record 7, and this movement of the reproducer will compress spring 14.

My repeating mechanism comprises a vertical plate 17, formed with a guide 18, and a slotted projecting arm 19, said plate being secured to the standard plates 4, by means of a bolt passing through the slotted arm 19. The vertical plate 17 is preferably formed with a narrowed upper end portion 20, and a plurality of apertures 21. An arm 22, carrying a hammer 22^a on one of its ends, and having the opposite end 24 bent at right angles to its body portion, is pivotally and adjustably mounted upon the plate 17 by means of a bolt 25 which is arranged to extend through apertures 21. End 24 of arm 22 is provided with a lateral pin 23, and a second pin 26 projects laterally from the plate 17 and is engaged by the arm 22. The arm 22 is connected by springs 27 and 28 to the plate 17 and to the bolt 25, which are adapted to quickly move the hammer 22^a downwardly with sufficient force to disengage the bolt-nut from its worm shaft. Should it be desired, one of the springs 27 or 28 may be dispensed with, by increasing the strength of the retained spring. A lever 29 formed with a slotted end 30 is pivotally mounted on the plate 17 by a bolt 31. A trip lever 32, formed with an aperture 33 and a V-shaped end, is mounted on lever 29 beyond the pivot bolt 31 and is adapted to engage arm pin 23 on lever 21 to raise the hammer 22^a, as will be hereinafter described. The lever 32 is held in a substantially vertical position by means of a spring 33, said spring having one of its ends secured to the end of lever 32 and its opposite end secured

to the middle portion of lever 29. Lever 29 is engaged by a horizontal bar 34 which is movable on the guide 18 and on a second guide 35 which is formed on reproducer arm

10. Bar 34 has one of its ends secured to the slotted end of lever 29 by a bolt 36, said bolt having its head projecting through said slotted end so as to securely connect lever 29 to bar 34. Bar 34 is formed with a plurality of apertures 37, through which pins 38 and 39 extend.

When the driving mechanism is set in motion, the record 7 will be rotated on the shaft 8 and the reproducer 11 will be moved across said record by means of the revolving shaft or worm 9. As the reproducer moves across the face of the record guide 35 will engage pin 39 on bar 34 thereby causing said bar to move with it. This movement will compress spring 14, move levers 29 and 32 so that the V-shaped end of lever 32 will engage pin 23 on arm 22, thereby raising the hammer 22^a. The hammer 22^a will be held in its raised position by lever 32 until the reproducer has completely crossed the record, and when this occurs, hammer 22^a will be released by the lever 32 and thrown downwardly by the springs 27 and 28 to strike pin 16 which will then be in line of engagement and thereby move nut 15 out of engagement with shaft 9, and when this disengagement occurs, spring 14 will automatically return the reproducer 11 to its starting position. As the reproducer begins to move to its starting position, guide 35 will engage pin 38 of arm 34 and thereby move levers 29 and 32 to their normal position. When the reproducer arm 10 arrives at its starting position, it will remain stationary unless the nut 15 is brought into engagement with shaft 9. This action is accomplished by means of a movable arm 40 which projects from standard plate 3 and by engagement with nut 15 moves the same against shaft 9. In case it is not desired to have the record repeated the arm 40 is moved on its pivot 41 so that the nut 15 will not be engaged by said arm, when the machine may be stopped.

My improved repeating device may be attached to any cylindrical phonograph by means of detail modifications.

From the foregoing description, taken in connection with the accompanying drawings, the construction and operation of the invention will be readily understood without requiring a more extended explanation.

Various changes in the form, proportion and the minor details of construction may be resorted to without departing from the principle or sacrificing any of the advantages of this invention as defined in the appended claims.

Having thus particularly described and ascertained the nature of my invention and

in what manner the same is to be performed, I declare that what I claim and desire to secure by Letters-Patent is:—

1. In a device of the class described, in combination with a phonograph, comprising a reproducer, a record and mechanism therefor, a plate arranged to be secured to the phonograph supports, levers mounted on the plate, a hammer engaged by the levers, a rod movable by said reproducer engaging with the levers, and means for disengaging said reproducer from its driving shaft.

2. In a device of the class described, in combination with a phonograph comprising a reproducer, a record, and mechanism therefor, a horizontally movable rod arranged to be engaged by the reproducer, levers moved by the rod, a hammer operated by the rod and means for returning the reproducer to its original position operated by the movement of the hammer.

3. In a device of the class described, in combination with a phonograph, comprising a record, a reproducer and mechanism therefor, a rod movable horizontally by the reproducer, levers connected with the rod, a hammer engaged by the levers, a movable nut carried by the reproducer engaged by the hammer, and a spring for returning the reproducer to its original position.

4. In a device of the class described, in combination with a phonograph, comprising a reproducer, a record and mechanism therefor, a plate arranged to be mounted on the supports of the phonograph, a hammer arm pivotally mounted on the plate, means for adjusting the hammer arm on the plate, a slotted lever, a lever carried by the slotted lever, a rod connected to the slotted lever and arranged to be engaged by the reproducer, means for disconnecting the reproducer from its driving shaft, and a spring for returning the reproducer to its original position.

5. In a device of the class described, the combination with a phonograph, comprising a record, a reproducer, and mechanism therefor, a movable rod engaged by the reproducer, a slotted lever engaged by the rod, a lever carried by the slotted lever and arranged to engage a hammer, a hammer engaged thereby, springs for controlling the hammer, means for disengaging the reproducer from its driving shaft, a spring for moving the reproducer to its original position, means for supporting the rod, the levers and the hammer, and a movable arm for limiting the movement of the reproducer.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses,

GEORGE F. PERRENOT.

Witnesses:

R. W. EASTERLING.

C. NEUMANN.

R. M. HUNTER.
 RECORD FOR SOUND REPRODUCING MACHINES.
 APPLICATION FILED AUG. 31, 1907.

937,680.

Patented Oct. 19, 1909.

Fig. 1

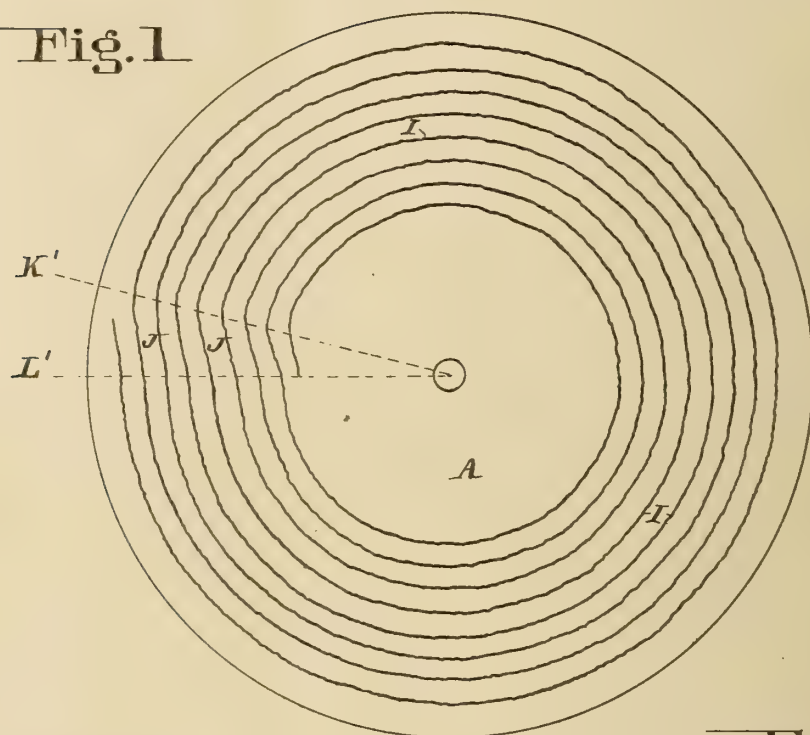


Fig. 2



Fig. 3

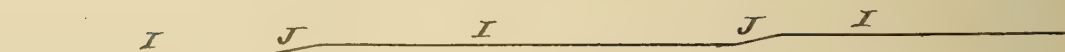
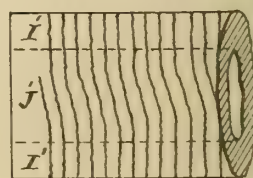


Fig. 4

WITNESSES

R. M. Kelly.
a. Rettig.

INVENTOR

R. M. Hunter.

UNITED STATES PATENT OFFICE.

RUDOLPH M. HUNTER, OF PHILADELPHIA, PENNSYLVANIA.

RECORD FOR SOUND-REPRODUCING MACHINES.

937,680.

Specification of Letters Patent.

Patented Oct. 19, 1909.

Application filed August 31, 1907. Serial No. 390,847.

To all whom it may concern:

Be it known that I, RUDOLPH M. HUNTER, of the city and county of Philadelphia and State of Pennsylvania, have invented an Improvement in Records for Sound-Reproducing Machines, of which the following is a specification.

My invention has reference to records for sound reproducing machines and consists of certain improvements which are fully set forth in the following specification and shown in the accompanying drawings which form a part thereof.

The object of my invention is to provide a construction of sound record tablet which, when operating in conjunction with the sound box and stylus, will, during the greater part of the time, cause a reproduction of the sounds without any feeding or propelling action upon the sound box and stylus or upon the record relatively to the sound box so that for about 95 per cent. of the time required to reproduce any piece, the stylus simply responds to the reproducing of sound and is not influenced by lateral feeding across the record tablet.

The result of the above described method of reproducing sound is that less scratchy tones result and the reproduction is more accurate, because there are no continuous lateral strains caused by the transverse feeding or propelling of the stylus by the groove and hence the lateral vibrations of the stylus are equally free in both directions.

My invention more especially resides in the sound record tablet, and this comprises the operating surface whether in disk or cylindrical form in which the groove over the greater part of its length is so formed that there is no requirement for a transverse feeding of the stylus and sound box, said feeding taking place only at widely separated intervals along the length of the groove and then only for very short periods of time.

More specifically, my invention is applied in its preferred form to what is known as the disk record such as employed in the ordinary gramophone, but the groove instead of being spiral is formed with a series of concentric circular parts connected by short diagonal grooved portions for feeding the stylus from the termination of one concentric groove to the beginning of the next adjacent concentric groove, the construction being such that there is no feeding action upon the

stylus across the record tablet during the travel of the concentric portions of the groove under the stylus and only during the time the short diagonal portions are operating upon the stylus.

My invention also comprehends details of construction which, together with the features above specified, will be better understood by reference to the drawings, in which:

Figure 1 is a plan view of a disk record embodying my invention; Fig. 2 is a cross-section of a portion of the same but on a larger scale; Fig. 3 is an elevation of a portion of a cylindrical record tablet embodying my invention; and Fig. 4 is a diagram illustrating the arrangement of the grooves when stretched out.

A is the body of the record and is provided with a series of concentric circular record grooves I. These concentric grooves have a common center with the center of the disk and hence with the turn-table of the ordinary sound reproducing machine when the disk is applied thereto. The concentric grooves I are not complete circles but for a short space are open as to themselves, but the termination of the outer groove is connected with the beginning of the next adjacent groove by a short diagonal groove J and so on with each successive concentric groove, as clearly indicated. The beginning and termination of each of these concentric grooves I are separated between the radial dotted lines K and L, and the surface constitutes a very small portion of the surface of the entire record disk, and consequently the grooved portions J likewise constitute a very small portion of the total length of the grooves of the record disk. In Fig. 1, the grooves I I are shown relatively far apart for clearness, and consequently the portions J have considerable obliquity, but in actual practice, the concentric grooves I I are approximately 1/100 of an inch apart, and therefore the obliquity of the connecting grooved portions J is hardly perceptible and produces no undue effect upon the stylus with regard to the reproduction of sound because it passes under the stylus so quickly and at such long intervals that any difference which might result would not be detected by the ear before it has occurred and passed. During the operation of the major part of the length of the combined grooves on the stylus there is no disturbing action

affecting the reproduction of sound due to the feeding action of the groove upon the stylus and sound box, which feeding action has heretofore required a greater pressure on one side of the groove than on the other by the stylus, and which, to that extent, has modified the purity of the tone which was reproduced by the instrument.

In Fig. 3, I have shown a portion of a cylindrical record, and in this case, the grooves I' lie in planes at right angles to the axis of rotation of the record tablet, and these portions are connected by the diagonal portions J' on the same general principle as specified in connection with Fig. 2. In this form of record tablet, the same advantage is secured where the record tablet is required to also feed the stylus, but because of the smaller diameter of the cylinder, there are relatively more of the diagonal grooved portions J', relatively to the length of the concentric portions I', than is the case in the disk form in Fig. 2.

If the grooves of Fig. 1 were stretched out, they would be as diagrammatically illustrated in Fig. 4, from which it will be seen that the only feeding action would be at the short diagonal portions J', and then only for very short durations of the total time it is required for the grooved portions to pass under the stylus. From this it will be seen that such defects as are introduced into the music or reproduction of sound, by the feeding action of the groove upon the stylus, is confined to a very small portion of the time which is required to reproduce the entire composition and then too, at widely separated intervals of time, so that the ear would not be alert enough to detect any difference before the cause for any such difference in the reproduction of sound has passed.

It will, of course, be understood that the general arrangement of the grooves illustrated in the drawings are more or less modified in their smoothness by the lateral sinuosities which are given to them under the sound vibrations through the recording stylus and which are totally independent of the position of the grooves which are defined by the device employed to relatively feed the recording surface under the engraving stylus when recording the sound record.

I do not limit myself to the arrangement of all of the portions J in the same radial position with respect to the surface of the record tablet as it is evident that they may be disposed in any other manner, regular or irregular as may be desired, the essential feature of the invention residing in the fact that the record tablet is so formed that a portion of the length of the groove therein is required to perform no function excepting that of reproducing sound, whereas the remaining and preferably very limited portion of its length is made to reproduce sound

and propel or feed the stylus transversely across the record tablet.

Having now described my invention, what I claim as new and desire to secure by Letters Patent, is:—

1. A flat sound record tablet having a series of laterally undulating sound record grooves of even depth in concentric circular arrangement but each forming less than a full circle and having the terminations of each circular groove connected by sound record grooves respectively with the beginning of sound record grooves of next smaller circumference.

2. A flat sound record tablet having a series of laterally undulating sound record grooves in concentric circular arrangement but each forming less than a full circle and having the terminations of each circular groove connected by diagonally arranged sound record grooves respectively with the beginning of sound record grooves of next smaller circumference.

3. A sound record tablet having its surface provided with a series of sound record grooves of substantially uniform cross section and of successively shorter length connected in series by a series of short sections of sound record grooves arranged diagonally to the first mentioned sound record grooves.

4. A sound record tablet having its surface provided with a series of concentrically arranged sound record grooves of successively shorter length connected in series by a series of parallel short sections of sound record grooves arranged diagonally to the first mentioned sound record grooves.

5. A sound record tablet having a series of parallel laterally undulating sound record grooves each of circular form and less than a full circle and connecting sound record grooves diagonally arranged with respect to the first mentioned grooves and connecting them in series.

6. A record tablet for sound producing machines which consists of a surface having a laterally undulating sound record groove formed therein and in which the said groove is made up of a series of circular parts the beginning and end of each of which parts are in alinement and a series of connecting parts arranged diagonally and connecting the series of circular parts in series to form one continuous groove which has its alinement changed only at long intervals in its length.

7. A record tablet having a laterally undulating sound record groove consisting of a series of grooved portions of circular arrangement but out of alinement connected in series by a series of diagonally arranged connecting grooves.

8. A record tablet having a laterally undulating sound record therein consisting of a series of sound record portions out of

alinement with each other and connected in series by a series of diagonally arranged connecting sound record portions.

5 9. A sound record tablet having a record groove in which a series of portions thereof are each constructed to have all portions lie in the same plane across the axis of the tablet and also at the same distance from the axis and said portions being connected in

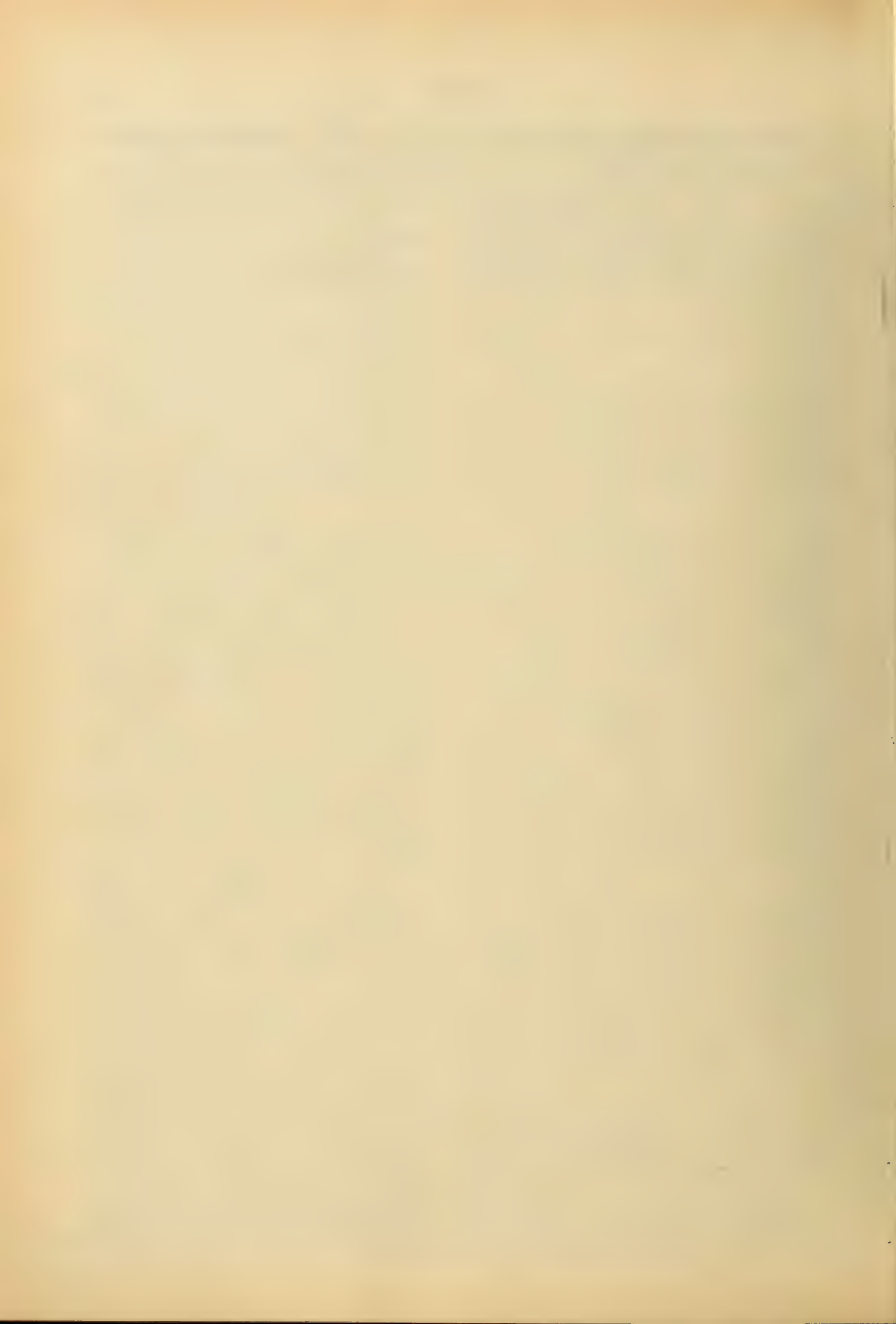
series by a series of diagonal record groove 10 portions.

In testimony of which invention I have hereunto set my hand.

R. M. HUNTER.

Witnesses:

R. M. KELLY,
M. F. DRISCOLL.



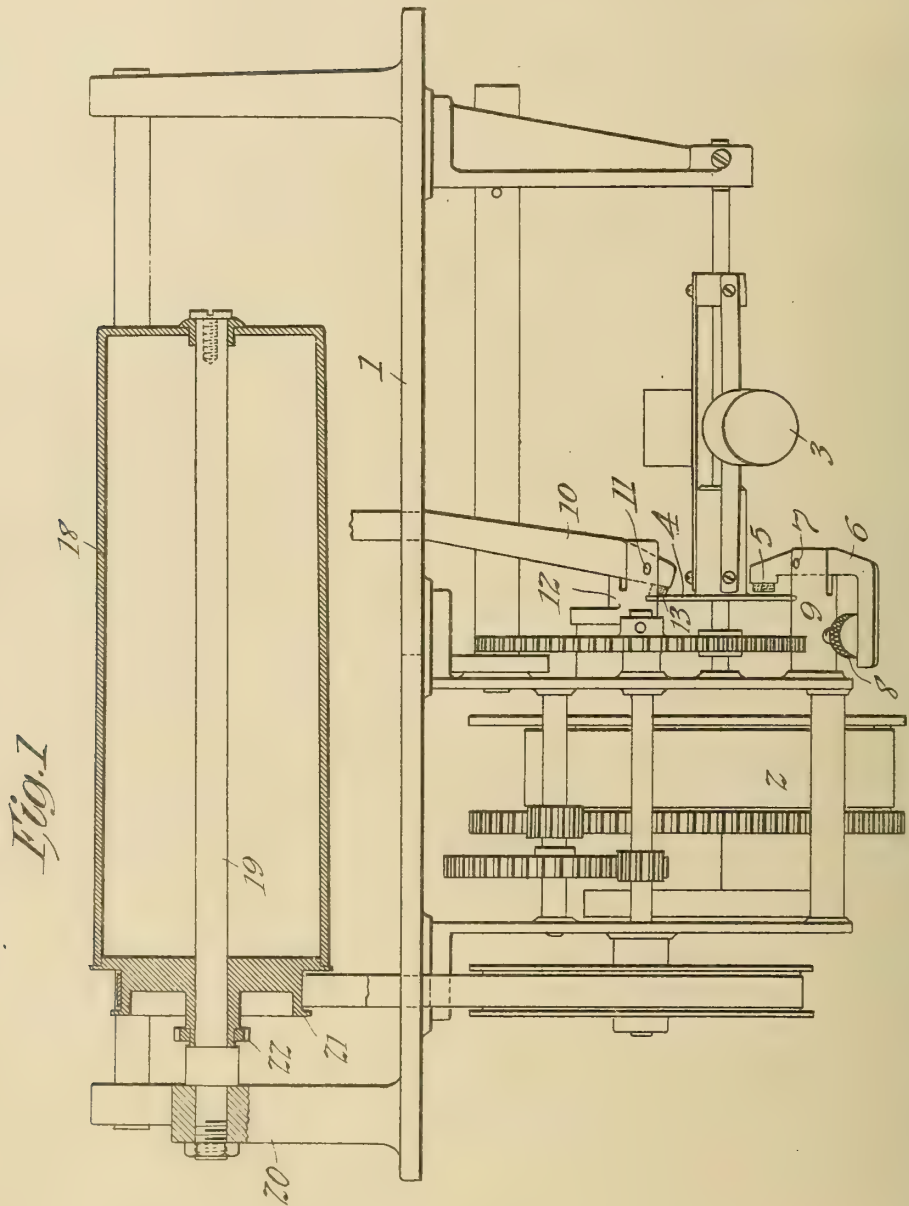
P. WEBER.
PHONOGRAPH.

APPLICATION FILED JAN. 20, 1908.

937,905.

Patented Oct. 26, 1909.

3 SHEETS—SHEET 1.



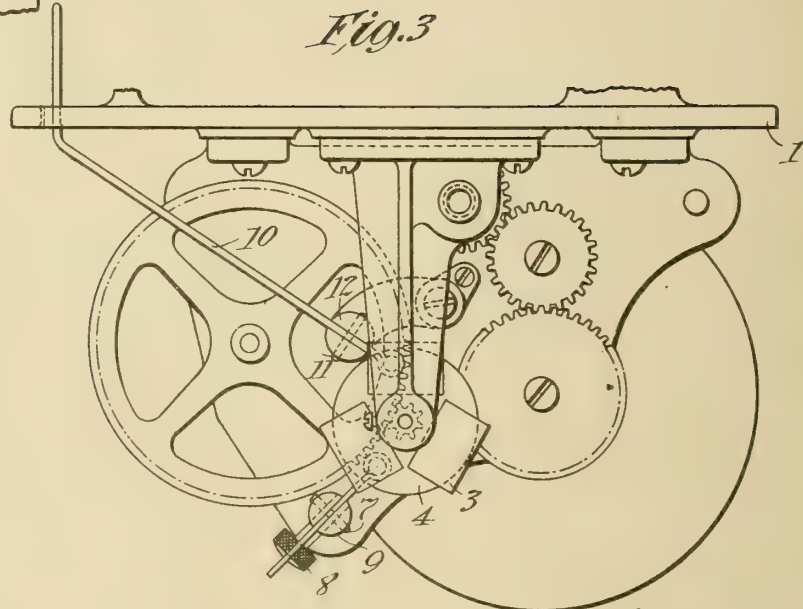
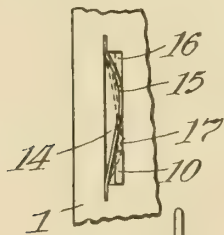
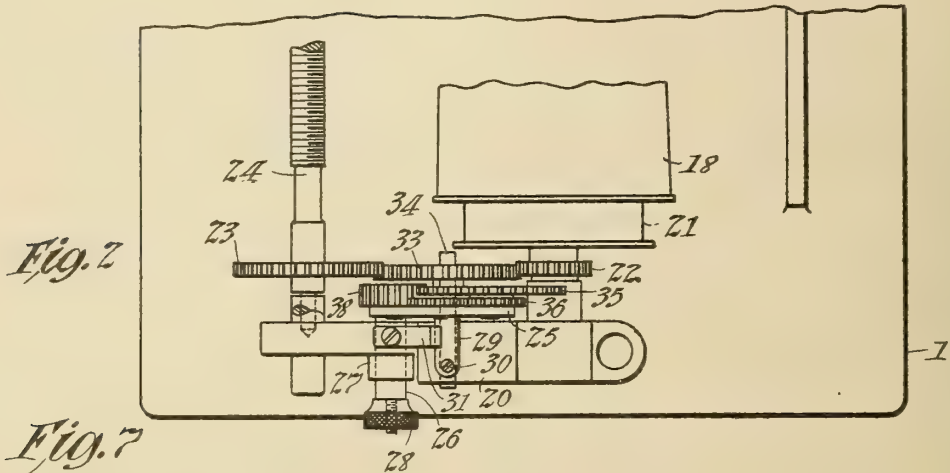
Witnesses:
Frank D. Lewis
Deputy Notary

Inventor:
Peter Weber
by Frank L. Ryan
Atty.

P. WEBER.
 PHONOGRAPH.
 APPLICATION FILED JAN. 20, 1908.

937,905.

Patented Oct. 26, 1909.
 3 SHEETS—SHEET 2.



Witnesses:
 Frank D. Lewis
 Delos Holden

Inventor:
 Peter Weber
 by Frank L. Ryan
 Atty.

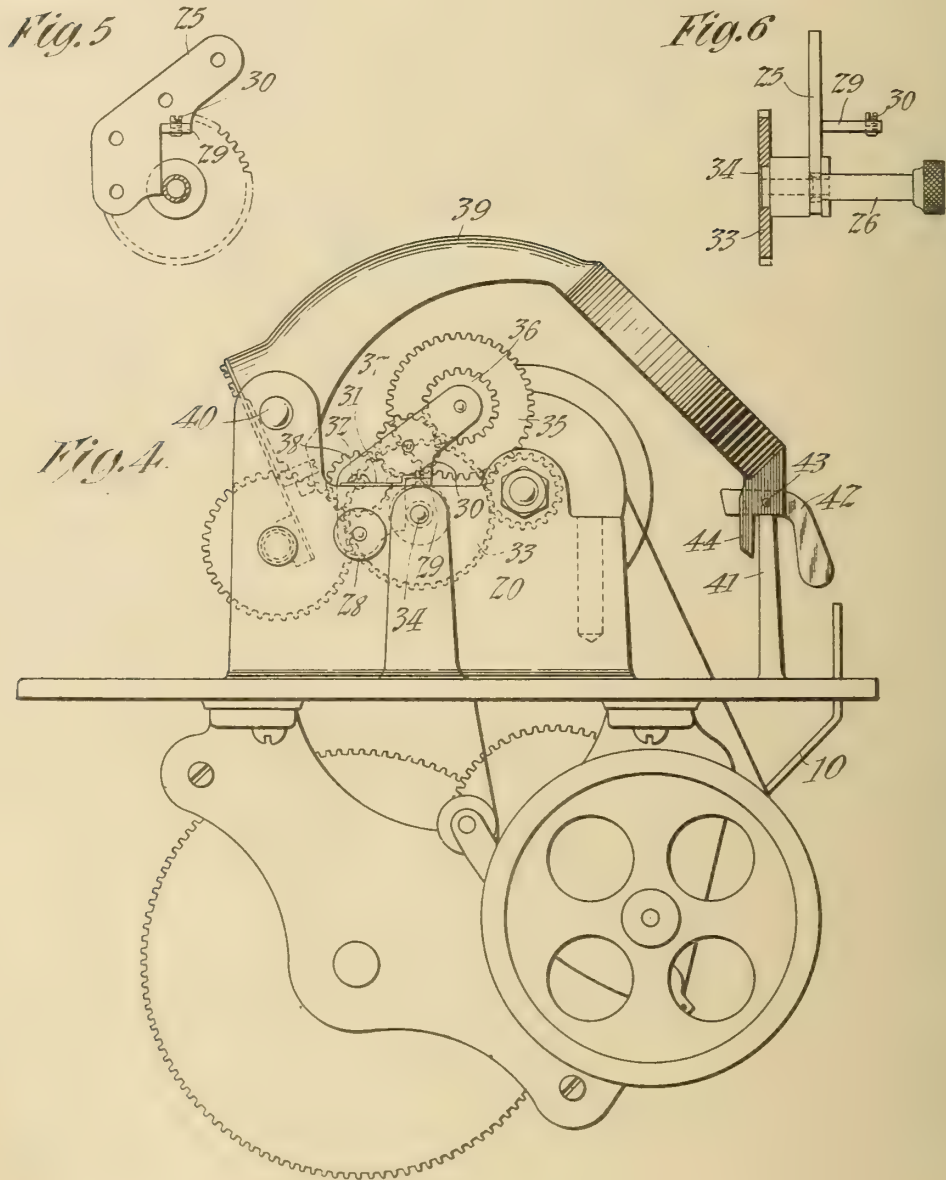
P. WEBER.
PHONOGRAPH.

APPLICATION FILED JAN. 20, 1908.

937,905.

Patented Oct. 26, 1909.

3 SHEETS—SHEET 3.



Witnesses:
Frank D. Lewis
Deland Holden

Inventor:
Peter Weber
By Frank L. Brown
Atty.

UNITED STATES PATENT OFFICE.

PETER WEBER, OF ORANGE, NEW JERSEY, ASSIGNOR TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

PHONOGRAPH.

937,905.

Specification of Letters Patent.

Patented Oct. 26, 1909.

Application filed January 20, 1908. Serial No. 411,828.

To all whom it may concern:

Be it known that I, PETER WEBER, a citizen of the United States, and a resident of Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Phonographs, of which the following is a description.

My invention relates to phonographs and has for its object the provision of (1) means applied to the traveling sound box carriage which permits a slight elevation thereof, such as is necessary in order that the sound record may be applied to or removed from the mandrel, but which prevents the said carriage from being raised more than the slight distance referred to; and (2) an improved form of interchangeable gearing for operatively connecting the mandrel and feed screw shaft, and which can be shifted so as to change the relative speeds of said rotary members, whereby the instrument will be capable of operating upon sound records of different pitch, as for example, sound records having respectively one hundred and two hundred threads per inch.

With these ends in view my invention consists in the features hereinafter described and claimed.

Reference is hereby made to the accompanying drawings, of which—

Figure 1 is a front elevation, partly in section, showing a phonograph constructed in accordance with my invention; Fig. 2, is a plan view of a portion of the phonograph showing the interchangeable gears for operatively connecting the mandrel and feed screw shaft; Fig. 3 is a side elevation of the base of the phonograph and its driving motor as viewed from the right in Fig. 1; Fig. 4 is a side elevation of the phonograph as viewed from the left, Fig. 1; Fig. 5 is a detail side view of the movable frame or support which carries a part of the interchangeable gear mechanism; Fig. 6 is a rear view of the same; and Fig. 7 is a detail plan view of the means for holding the starting and stopping lever.

The phonograph shown comprises a base or bed plate 1, from which the frame work of the driving motor 2 is suspended. The said motor is preferably a spring motor comprising the usual spring barrel, countershafts, gears and governor shaft to which the governor is applied, and which comprises centrifugal weights 3 and a slidable

friction disk 4. The speed of the motor is regulated by a friction pad 5 of felt or other suitable material, which is secured to one end of an L shaped lever 6, which is pivoted at the point 7 to the post 9 carried by the frame of the motor. The other arm extends immediately in front of the head of an adjusting screw 8, which is threaded in the post 9. As the screw 8 is screwed into the post 9 it permits the friction pad 5 to be moved away from the disk 4, and thereby allows the motor to run at an increased speed. A movement of the screw 8 toward the arm of the lever 6 causes the friction pad to move toward the disk 4 and thereby diminishes the speed at which the motor can run; thus a very simple adjustment is provided which permits of the motor running at any definite speed within the range at which it is capable of operating.

The means for starting and stopping the motor consists of a lever 10 pivotally connected at 11 to the post 12 carried by the motor frame, and which carries at its lower end a pad 13, so situated as to be brought into contact with the disk 4, for stopping the motor, said position being illustrated in Fig. 1. When the upper end of the lever 10 is moved toward the left, the pad 13 will be withdrawn from engagement with the disk 4, and the motor will thereupon start. The lever 10 passes through a slot 14 (see Fig. 7) formed in the bed plate 1. A flat spring 15 is secured in the said slot, the spring being in the form of a bow, the ends of which are at one side of the slot and the middle of which presses against the opposite side of the slot, thus forming two spaces 16 and 17 each of which is adapted to receive the end of the lever 10. The spring holds the lever firmly in position at either end of the slot, and at the same time readily permits the lever to be moved from one extreme position to the other, one position being indicated in full lines, Fig. 7, and the other in dotted lines.

The means here described for regulating the speed and the starting and stopping of the motor are not here claimed.

The phonograph also comprises a mandrel 18 rotatably supported in any suitable manner, as for example, the ends of the mandrel may be journaled upon a horizontal rod 19, which is bolted at one end to the upright 20, formed integral with the base 1, and the

mandrel is provided with a pulley 21 over which the driving belt from the motor runs.

A spur gear 22 is fixedly secured to the mandrel, and there is a spur gear 23 fixed 5 to the feed screw shaft 24, which is rotatably supported by the base 1 in any suitable manner. In order to operatively connect the gears 22 and 23 with interchangeable driving mechanism, I provide a frame or 10 support 25 shown in detail in Figs. 5 and 6. This frame is applied to the upright 20 of the base 1, and is movably supported thereby in the following manner: The pin 26 which extends outward from the frame 25 passes 15 through a boss 27 integral with the upright 20, and the same is provided with a removable head 28 which acts as a stop for limiting the inward movement of the said frame, the outward movement thereof being limited 20 by the engagement of the main body of the frame with the upright 20. The frame 25 is also provided with a projecting arm 29 in whose extremity is threaded a screw 30 which is adapted to bear against the upper 25 surface of the upright 20, and which provides for a slight angular adjustment of the frame 25 around the pin 26 as an axis. The end of the screw 30 is pressed against the surface of the upright 20 by means of a 30 spring 31, which is secured to said upright by the screw 32, and whose free end is bent into the shape clearly shown in Fig. 4, so as to press downward upon the arm 29 when the same is elevated by the adjusting screw 35 30. The spring 31 also acts as a guide for said arm 29 when the frame 25 is moved in and out for the purpose of shifting the gears carried thereby. The said gears comprise two sets, one set consisting of a single spur 40 gear 33 rotatably mounted upon a stud 34 carried by said frame 25 and adapted to operatively connect the gears 22 and 23 when the frame 25 is in its extreme outward position as shown in Fig. 2. The other set 45 consists of a train of spur gears 35, 36, 37 and 38 and said train is so arranged as to operatively connect the gears 22 and 23 when the frame 25 is in its extreme inward position.

The various gears are so proportioned that when the gear 33 is in mesh with the gears 22 and 23, the feed screw shaft 24 will be driven at the proper speed for operatively feeding the sound box carriage 39 with respect to a 55 sound record, the pitch of whose record groove is one one-hundredths of an inch, and when the gear train 35, 36, 37 and 38 is in operative connection with the gears 22 and 23 the feed screw shaft 24 will be rotated at 60 a speed suitable for operatively feeding the sound box carriage with respect to a record the pitch of which is one two-hundredths of an inch.

In order to shift the gearing from the 65 position shown in Fig. 2, all that is neces-

sary to do is to move the frame 25 inward by pushing upon the head 28 of the pin 26, so that the gear 33 will be moved out of engagement with the gears 22 and 23, and the gear train 35, 36, 37 and 38 will be 70 brought into operative relation with said gears, and in order to provide for slight variations in the position of the frame 25, which would tend to prevent the gears from properly meshing with the gears 22 and 23, 75 the angular adjustment of the frame 25, by means of the screw 30, as previously described, is provided.

The sound box carriage 39 is sleeved at its rear upon the guide rod 40, and its forward 80 end rests upon the straight edge or track 41, a lift lever of the usual form being pivoted upon the pin 43 and serving to elevate the said carriage a sufficient distance to cause the stylus of the reproducer or recorder to 85 clear the surface of the sound record, in order that the record may be removed from the mandrel or applied thereto. Further upward movement of the carriage is, however, prevented by reason of the engagement with 90 the track 41 of the arm 44, which depends from the carriage as shown in Fig. 4, and is so formed that its extremity will impinge against the rear surface of the track 41, in case the attempt is made to raise the car- 95 riage beyond the position to which it may be elevated by the lift lever 42, thus preventing the carriage 39 from being swung completely around upon the rod 40, or into such a position as would expose the feed nut and 100 its supporting spring.

Having now described my invention, what I claim is:

1. In a phonograph, the combination of the guide rod 40 and sound box carriage 105 sleeved thereon, said carriage being movable vertically sufficiently to enable the recording or reproducing stylus to clear the record surface, and means for preventing further vertical movement of the said carriage, substantially as set forth. 110

2. In a phonograph, the combination of the guide rod 40 and sound box carriage sleeved thereon, of a track 41, upon which the forward end of the said carriage is supported, and a projection 44 secured to said carriage and so situated as to impinge 115 against said track 41 and prevent vertical movement of said carriage beyond that necessary to allow the reproducer or recorder stylus to clear the record surface, substantially as set forth. 120

3. In a phonograph, the combination with the rotating mandrel, feed screw and traveling carriage, of a support provided with two 125 sets of gears for operatively connecting said mandrel and feed screw, said support being movable in the direction of the axes of said gears so as to bring each set thereof into and out of driving relation with said 130

mandrel and feed screw, substantially as set forth.

4. In a phonograph, the combination with the rotating mandrel, feed screw and traveling carriage, of spur gears 22 and 23 fixed to said mandrel and feed screw, and a movable support provided with two sets of gears each of which sets is movable into and out of driving relation with said gears 22 and 23, substantially as set forth.

5. In a phonograph, the combination with the rotating mandrel, feed screw and traveling carriage, of spur gears 22 and 23 fixed to said mandrel and feed screw, a movable support provided with two sets of gears each of which sets is movable into and out of driving relation with said gears 22 and 23, and means for adjusting said support in a direction transverse to its line of movement, substantially as set forth.

6. In a phonograph, the combination with the rotating mandrel, the feed screw and gears on the same, of gear connections for connecting the same, and a support 25 for the said interconnecting gears, movable in a direction parallel to the axis of the mandrel, means for adjusting said support in a direction transverse to its direction of movement, and a spring 31 which operates as a guide for the support during its in and out

movement, and which opposes the transverse adjustment of the same, substantially as set forth.

7. In a phonograph, the combination of the base having an upright, the rotating mandrel and feed screw shafts supported thereby, and gears on the same, a gear supporting frame movably supported by said upright and provided with gears for inter-connecting the gears on the said shafts, and with an arm or extension 29, an adjusting screw 30 and a spring 31, substantially as set forth.

8. In a phonograph, the combination with the base, the rotating mandrel and feed screw shafts and gears on the same, of the pivotal gear support 25 and gears carried thereby for inter-connecting the gears on the said shafts, the said pivotal gear support being movable in a direction parallel to the axis of the mandrel, and means for angularly adjusting the same, substantially as set forth.

This specification signed and witnessed this 13th day of January, 1908.

PETER WEBER.

Witnesses:

H. H. DYKE,

FRANK D. LEWIS.

L. P. VALIQUET.
TALKING MACHINE.
APPLICATION FILED MAY 8, 1909.

Patented Oct. 26, 1909.
2 SHEETS—SHEET 1.

938,185.

Fig. 2.

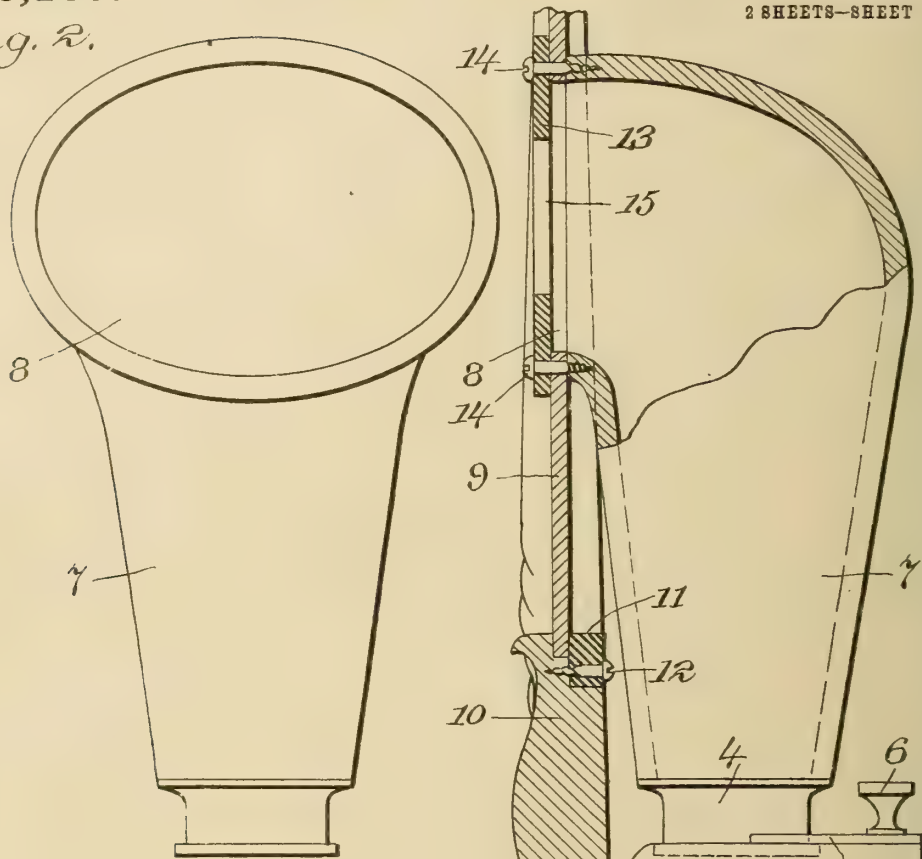
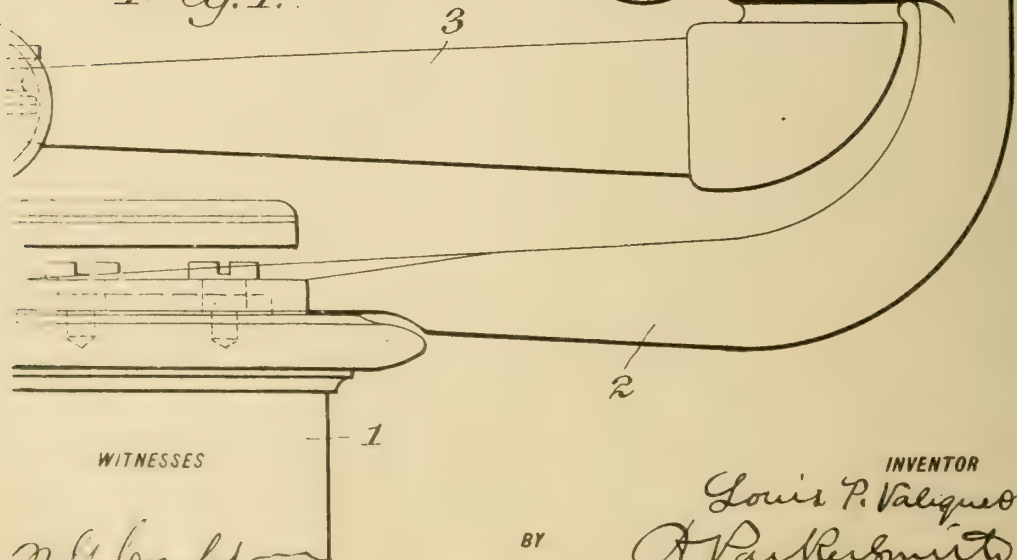


Fig. 1.



WITNESSES

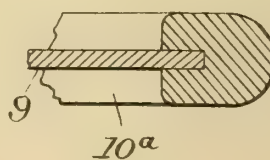
M. G. Crawford
H. A. Reigel

BY

INVENTOR
Louis P. Valiquet
A. Parker Smith
his ATTORNEY

938,185.

Fig. 3.



Witnesses:
M. G. Crawford
H. A. Kiegel

Inventor
Louis P. Valiquet
By his Attorney
Wm. Rushmore

UNITED STATES PATENT OFFICE.

LOUIS P. VALIQUET, OF NEWARK, NEW JERSEY, ASSIGNOR TO COMPLEX AURAL COMPANY, OF NEWARK, NEW JERSEY, A CORPORATION OF NEW JERSEY.

TALKING-MACHINE.

938,185.

Specification of Letters Patent.

Patented Oct. 26, 1909.

Application filed May 8, 1909. Serial No. 494,801.

To all whom it may concern:

Be it known that I, LOUIS P. VALIQUET, a citizen of the United States of America, residing at Newark, county of Essex, State of New Jersey, have invented certain new and useful Improvements in Talking-Machines, of which the following is a specification.

My invention relates to talking machines, and particularly comprises an improved form of sound board or sound modifying and amplifying device for application thereto.

While my invention may be applied to all forms of talking machines, it is particularly adapted in the form shown for use on the ordinary disk record talking machine.

The best form of apparatus embodying my invention at present known to me is illustrated in the accompanying two sheets of drawings in which:

Figure 1 is a side elevation of a portion of a talking machine with one form of my invention applied thereto, the sounding board and attached parts being shown partly in section, and partly broken away. Fig. 2 is a front elevation of the particular form of sound receptacle, which takes the place of the usual horn, forming a part of my invention. Fig. 3 is a front elevation of a modified form of sounding board attached to such sound receptacle, and Fig. 4 is a detail cross section on line 4—4 of Fig. 3.

Throughout the drawings, like reference figures indicate like parts.

1 represents a portion of the body of a talking machine having the usual form of bracket 2 supporting the usual form of tapered arm or tube 3, through the contained air in which sound waves are transmitted.

4 is a coupling ring preferably formed of metal adapted to set in the bracket 2 and be retained therein by the clip 5 and set screw 6.

7 is a short upright slightly flaring sound receptacle formed of wood, its upper larger end being curved so as to form an opening 8 in a vertical plane. To this the sounding board 9 is attached, which should be formed of the best material employed for sounding boards in pianos or similar musical instruments. This sounding board is provided with an outer frame 10, preferably of wood, of heavier construction which may be given any desired ornamental form, as indicated in Fig. 1, or may be made plain or as indicated at 10^a in Fig. 3. The frame 10 is

preferably grooved or rabbeted, as shown in Fig. 4, to receive the sounding board, and the latter may be sprung or slipped into place or may be retained by a strip 11, as shown in Fig. 1, held in position by gluing or by set screws 12, or other fastening.

13 is an inner frame of heavier material than the sounding board, preferably wood, having openings 15, 15, in line with an opening in the center of the sounding board, and all these openings being in line with the opening 8 in the end of the sound receptacle.

The inner frame, sounding board and the sound receptacle may be glued together or fastened by screws 14, 14, or other fastening devices, or by the aid of both glue and fastening devices. In Fig. 3, the frame 10^a is shown made in two parts glued or otherwise fastened together at 16, 16.

In operation, my invention acts like the sounding board of a piano or the body of a violin to amplify and enrich the sound vibrations so that round musical tones are produced by even the poorer qualities of sound records and machines, and the sound amplified to an extent equal to the effect which would be produced by a very large horn.

Another advantage of my invention is that the sound waves are evenly dispersed in many directions, instead of being all focused along one line, as is the case with the ordinary horn not provided with a sound deflector. This feature helps greatly where a large number of people desire to hear a record reproduced.

It is evident of course that changes could be made in the form of the sounding board and its connections and the method of assembling and connecting the same, without departing from the principle of my invention, although I find that the best results are produced by approximately the contour of sound receptacle and arrangement of parts shown in the drawing. I also find that the best effects are produced when the sounding board is not positively fastened to the outer frame but snugly fitted into same. This leaves the sounding board free to vibrate. Furthermore, the best results are obtained only when the sound receptacle 7 is made of wood, and the sounding board 13 is attached immediately to it. The use of intervening stays or other intermediate con-

nection interferes with the perfect transmission of the vibrations from sound receptacle to sounding board.

While various methods of fastening the wooden sounding board to the wooden sound receptacle are effective in varying degree, the best result is only secured when the two are glued together so as to form practically an integral structure.

10 Having, therefore, described my invention, I claim:

1. In a talking machine, the combination with the usual tube through the contained air in which reproduced sound waves are transmitted, of a wooden sound receptacle open at one end and having its interior connected with said tube, and a sounding board attached to said open end of said sound receptacle.

20 2. In a talking machine, the combination with a wooden sound receptacle open at one end, of a sounding board attached to the open end thereof, and provided with an opening in line with the opening of the sound receptacle.

3. In a talking machine, the combination with the usual tube through the contained air in which reproduced sound waves are transmitted, of a vertical wooden sound receptacle open at one end and having its interior connected with said tube, and a sounding board attached to said open end of said sound receptacle.

4. In a talking machine, the combination with a vertical wooden sound receptacle, open at the end, of a sounding board attached to the open end thereof, and provided with an opening in line with the opening of the sound receptacle.

5. In a talking machine, the combination with a wooden sound receptacle, open at one end, of a sounding board attached to the open end thereof, and provided with an exterior frame of heavier construction.

6. In a talking machine, the combination with a wooden sound receptacle, open at one end, of a sounding board attached to the open end thereof, and provided with an opening in line with the opening of the said sound receptacle, and an exterior frame of wood of heavier construction.

7. In a talking machine, the combination with the usual tube through the contained air in which reproduced sound waves are transmitted, of a wooden sound receptacle open at one end and having its interior connected with said tube, and a sounding board

glued to said open end of said sound receptacle.

8. In a talking machine, the combination with a wooden sound receptacle, open at one end, of a sounding board glued to the open end thereof, and provided with an opening in line with the opening of the said sound receptacle.

9. In a talking machine, the combination with a wooden sound receptacle open at one end, of a sounding board attached to the open end thereof, and provided with an opening in line with the opening of the said sound receptacle and a grooved exterior frame of wood with which the edges of the sounding board engage.

10. In a talking machine, the combination with a wooden sound receptacle open at one end, of a sounding board attached to the open end thereof and provided with an opening in line with the opening of the said sound receptacle, an open framework of heavier construction placed over said opening, and an exterior frame for the sounding board also of heavier construction.

11. In a talking machine, the combination with a wooden sound receptacle open at one end, of a sounding board attached to the open end thereof, and provided with an opening in line with the said opening of the sound receptacle, an open framework of heavier construction placed over said opening, and an exterior grooved frame for the sounding board with which the edges of the sounding board engage.

12. In a talking machine, the combination with an upright wooden sound receptacle curved to form an opening in a vertical plane, of a sounding board attached to the open end thereof and provided with an opening in line with the said opening, an open framework of heavier construction placed over said opening, and an exterior grooved frame for the sounding board with which the edges of the sounding board engage.

13. In a talking machine, the combination with a sound receptacle open at one end, of a sounding board attached immediately to the open end thereof, and provided with an opening in line with the opening of the said sound receptacle.

LOUIS P. VALIQUET.

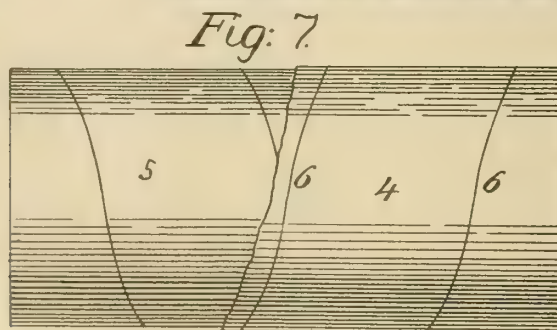
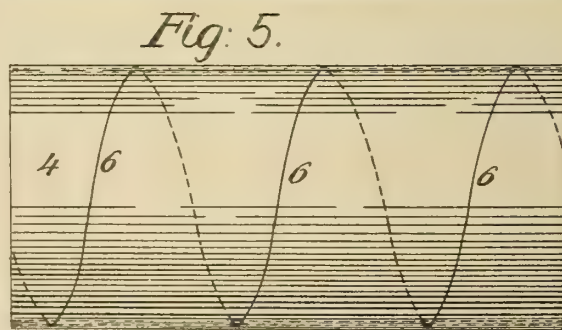
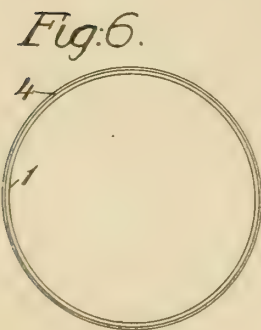
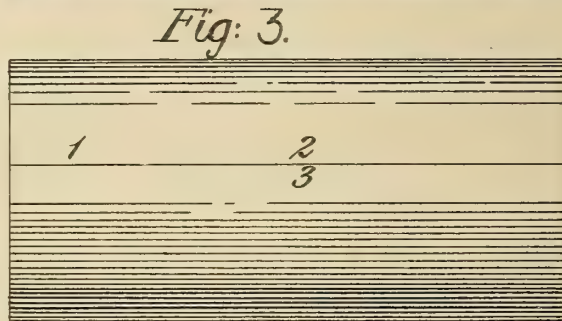
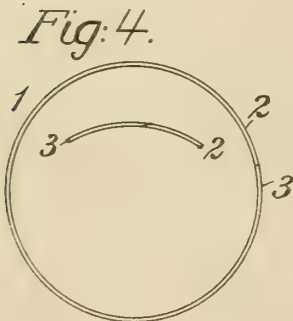
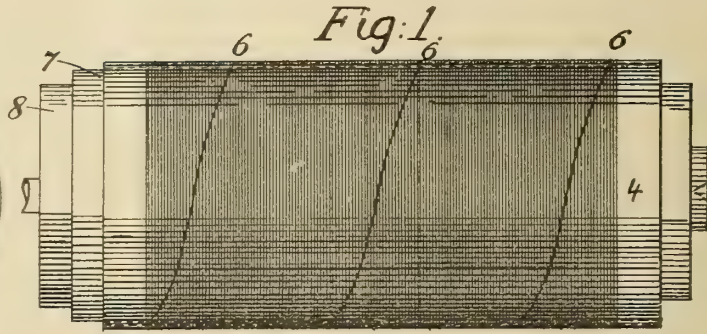
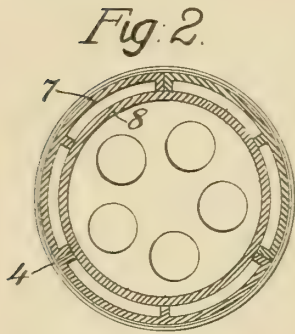
Witnesses:

A. PARKER-SMITH,
M. G. CRAWFORD.

F. C. APPLEGATE.
 PROCESS OF MAKING PHONOGRAMS.
 APPLICATION FILED MAR. 29, 1909.

939,119.

Patented Nov. 2, 1909.



Frank C. Applegate

Witnesses:

Harry C. Aumack
 Louis. Diehl

Inventor

By his Attorney

Robert Hillgar

UNITED STATES PATENT OFFICE.

FRANK COLSEN APPLGATE, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR, BY MESNE ASSIGNMENTS, TO ROYAL PHONE & PHONOGRAM CO., OF BOSTON, MASSACHUSETTS, A CORPORATION OF MAINE.

PROCESS OF MAKING PHONOGRAMS.

939,119.

Specification of Letters Patent.

Patented Nov. 2, 1909.

Application filed March 29, 1909. Serial No. 486,431.

To all whom it may concern:

Be it known that I, FRANK COLSEN APPLGATE, a citizen of the United States, residing in the city and county of Philadelphia, in the State of Pennsylvania, have invented certain new and useful Improvements in Processes of Making Phonograms, of which the following is a specification.

My invention relates to the manufacture of cylindrical phonograms of celluloid, xylonite or like material, and my object is to cheaply produce such phonograms from sheet material and in which the united edges of the sheet run approximately circumferentially to eliminate the unpleasant knocking sound caused by a stylus striking a longitudinal joint during reproduction. Hitherto such phonograms have been made of seamless tubular material and the cost has been excessive. Neither can tubes be manufactured thin enough to give the desired flexibility. Unsuccessful attempts have been made to use sheet material with a lap joint but such joint struck the stylus squarely at right angles to the line of motion and caused a clicking or knocking sound on each revolution of the record. In addition to this the lapping of the material made a double thickness at the joint which caused the record to run eccentrically with respect to the stylus.

I attain my objects and obviate the difficulties in the manner illustrated in the accompanying drawing in which:—

Figure 1 is a view of my improved phonogram on a mandrel; Fig. 2 is a cross sectional view of the structure of Fig. 1; Fig. 3 is a view of a backing for my improved phonogram; Fig. 4 is an end view of the structure of Fig. 3; Fig. 5 is a view of the structure of Fig. 3 with the facing ribbon secured thereto; Fig. 6 is an end view of the structure of Fig. 5; Fig. 7 is a view, partly in section, of a modified form of my improved phonogram.

In making my improved phonogram a backing sheet 1 is wrapped about a substantially cylindrical form with its edges 2 and 3 either butting, or beveled and slightly lapping as shown in Fig. 4. The edges may be united by the use of cement, or a solvent may be used to soften them and bind or weld them together. A facing ribbon 4 is then

wound helically around the backing as shown in Figs. 5 and 6. Before this ribbon is wound onto the backing the surfaces to be joined may be treated with a solvent or a cement so that the backing and facing will be firmly united. My preferred material for the backing and facing is celluloid and I find that acetone softens this material so that it welds or binds together. As the acetone does not dry out quickly ample time is afforded for the various operations. It is apparent that the edges of the facing strip 4 will touch in the form of a helical line 6 running from end to end of the phonogram. The blank thus formed is then placed in a polished die and expanded therein under internal heat and pressure whereby the solvent is driven off or the cement dried, the softened celluloid is driven into intimate contact with the polished die and when dry and hard has the high polish of the die. As the material is packed and welded together along the helical joint a substantially smooth and even outer surface is produced. The sound record may now be printed or impressed on the phonogram thus produced by any of the well known methods. If preferred the polishing die may be omitted and the record impressed directly on the newly formed blank.

As shown in Fig. 7 the backing is in the form of a ribbon 5 wound in a direction opposite to that of the facing.

A backing of cheap, coarse celluloid may be employed and the facing strip may be, and preferably is a thin ribbon of fine celluloid. To secure the best results the facing ribbon should be of such width that only a single joint is crossed by the stylus on each revolution. As the line of union of the edges of the facing ribbon is helical, it runs approximately circumferentially when it passes under the stylus and does not cause the knocking sound that a joint striking the stylus transversely to the line of motion does.

By the use of thin sheet material the phonograms may be materially thinner than those made of tubing and consequently more flexible.

Records made according to my invention are of uniform thickness throughout and run true.

In use the phonogram is placed on a man-

drel sleeve 7 which is placed on the talking machine mandrel 8. It is then played like any other cylinder record.

I claim:—

5 1. The process of making cylindrical phonograms consisting of forming a backing sheet into a cylinder, helically winding a ribbon of celluloid or like material thereon with its edges abutting, uniting the facing
10 and backing and the edges of the facing, placing the blank thus formed within a die and expanding the same therein under heat and pressure whereby the blank is given a smooth outer surface.

15 2. The process of making cylindrical phonograms which consists in helically winding a ribbon of celluloid or like material, uniting its edges, placing the blank thus formed within a die and expanding the same therein
20 under heat and pressure.

3. The process of making cylindrical phonograms which consists in softening a ribbon

of celluloid or like material with acetone or similar substance, winding the same into a helix, uniting the edges, placing the blank 25 thus formed within a die and expanding the same therein under heat and pressure.

4. The process of making cylindrical phonograms which consists in forming a backing sheet of coarse celluloid into a cylinder, 30 helically winding a ribbon of celluloid or like material of a finer grade than the backing thereon, uniting the facing, backing and edges of the facing of the blank thus formed, placing the blank within a die and expand- 35 ing the same therein under heat and pressure.

In testimony whereof I have hereunto subscribed my name in the presence of two witnesses.

FRANK COLSEN APPLGATE.

Witnesses:

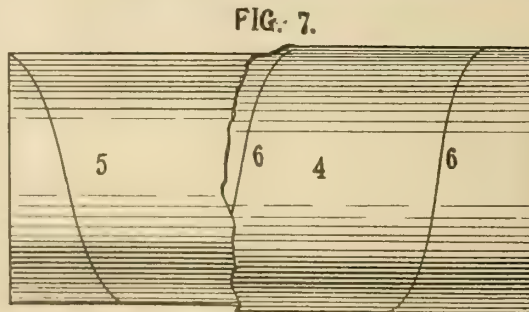
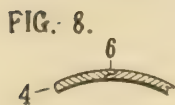
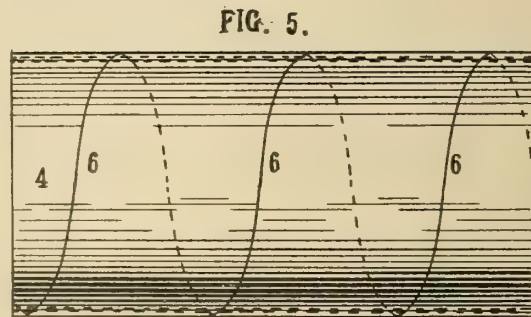
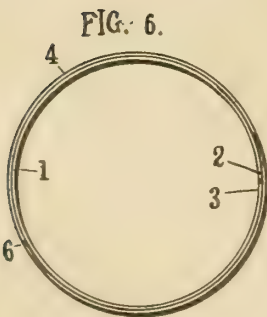
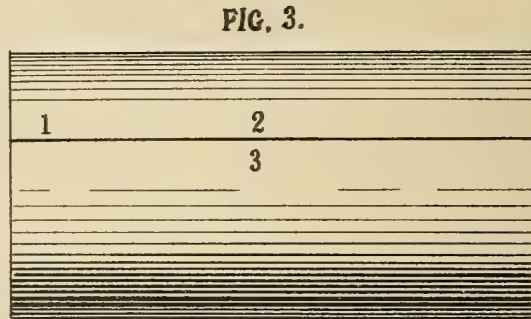
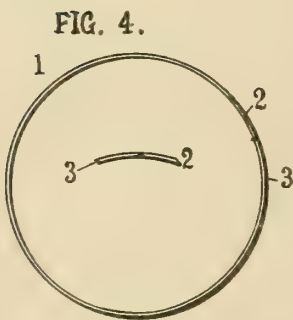
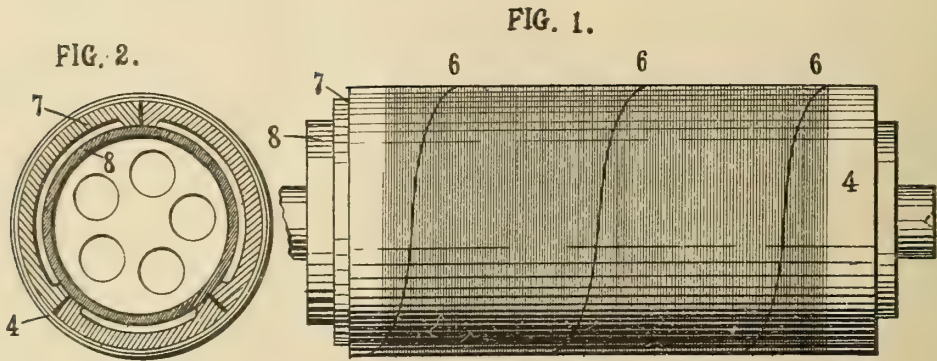
HELEN S. LUPTON,
MARY E. ACKLEY.

F. C. APPLGATE.
PHONOGRAM.

APPLICATION FILED FEB. 20, 1907. RENEWED MAR. 29, 1909.

939,120.

Patented Nov. 2, 1909.



Witnesses
Wm. H. Shaw
Thomas Liehl

By his Attorney
R. B. Killgore

Frank C. Applgate
Inventor

UNITED STATES PATENT OFFICE.

FRANK COLSEN APPLGATE, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR, BY MESNE ASSIGNMENTS, TO ROYAL PHONE & PHONOGRAM CO., OF BOSTON, MASSACHUSETTS, A CORPORATION OF MAINE.

PHONOGRAM.

939,120.

Specification of Letters Patent.

Patented Nov. 2, 1909.

Application filed February 20, 1907, Serial No. 358,404. Renewed March 29, 1909. Serial No. 486,531.

To all whom it may concern:

Be it known that I, FRANK COLSEN APPLGATE, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Phonograms, of which the following is a specification.

My invention relates to cylindrical phonograms of impressible material such as celluloid, xylonite or the like material, and my object is to cheaply produce such phonograms from sheet material and in which the united edges of the sheet run approximately circumferentially to eliminate the unpleasant knocking sound caused by a stylus striking a longitudinal joint during reproduction.

Hitherto such phonograms have been made of seamless tubular material and the cost has been excessive. It has been found impracticable to commercially produce tubes thin enough to give the desired flexibility. Unsuccessful attempts have been made to use sheet material with a lap joint but such joint struck the stylus squarely at right angles to the line of motion and caused a clicking or knocking sound at each revolution of the record.

I attain my objects and obviate the difficulties in the manner illustrated in the accompanying drawing in which:—

Figure 1 is a view of my improved phonogram on a mandrel; Fig. 2 a cross sectional view of the structure of Fig. 1; Fig. 3 a view of the backing of my improved phonogram; Fig. 4 an end view of the structure of Fig. 3; Fig. 5 a view of the structure of Fig. 3 with the facing ribbon secured thereto; Fig. 6 an end view of the structure of Fig. 5; Fig. 7 a view, partly in section, of a modified form of my improved phonogram; and Fig. 8 a view of a lapped joint facing.

My improved phonogram comprises a ribbon of impressible material wound helically with the edges either butting or slightly lapping. Before this ribbon is wound into a helix the edges to be united are treated with a solvent or cement so they will be firmly united.

In practice a backing sheet 1 is wrapped about a substantially cylindrical form or core with its edges 2 and 3 either butting or slightly lapping, in the latter form the edges

are preferably beveled. The facing ribbon 4 is then wound helically around the backing as shown in Figs. 5 and 6. Before this ribbon is wound onto the backing the surfaces to be joined may be treated with a solvent or cement so that the backing and facing will be firmly united.

My preferred material for both facing and backing is celluloid or xylonite but any impressible sheet material may be used. I find that acetones have the property of softening the materials named so that they bind or weld together. As the acetones do not dry out quickly ample time is afforded for the various operations.

It is apparent that the edges of the facing strip 4 will touch or lap in the form of a helical line 6 running from end to end of the phonogram. If a lapped joint is used the finishing process squeeze the soft material in such manner that the double thickness caused by the lapping is completely obliterated. The blank thus formed is then placed in a polished die and expanded therein under the combined influence of heat and pressure whereby the solvent or cement is driven off. The softened material is driven into intimate contact with the die and when dry and hard has the high polish of the die. As the material is compacted and welded together along the helical line of union a substantially smooth and even outer surface is obtained. The sound record may now be impressed on the blank thus produced by any of the well known methods.

If preferred the smooth polished die may be replaced by a sound matrix and the sound record impressed on the blank in the first instance but I find in practice that the best results are obtained by first making the blank with a polished surface.

As shown in Fig. 7 the backing is in the form of a ribbon 5 wound in a direction opposite to that of the facing.

A backing of cheap, coarse celluloid may be employed and the facing strip may be, and preferably is, a thin ribbon of fine celluloid. To secure the best results the facing should be of such width that only a single joint is crossed by the stylus on each revolution. As the line of union of the edges of the facing ribbon is helical it runs approximately circumferentially when it passes under the stylus and does not cause

the knocking sound that a joint striking the stylus transversely does.

By the use of thin sheet material the phonograms may be materially thinner than those made of seamless tubing and consequently more flexible. Records made in accordance with my invention also run true when in use as they are of uniform thickness throughout.

10 In use the phonogram is placed on a mandrel sleeve 7 of any desired type which is placed on the talking machine mandrel 8. It is then played like an ordinary cylinder record.

15 I claim:—

1. A cylindrical phonogram comprising a strip or ribbon of impressible material wound into a helix and having its edges united.

20 2. A cylindrical phonogram of impressible material comprising a backing sheet and a facing ribbon helically secured thereon with its edges united.

25 3. A cylindrical phonogram of impressible material comprising a backing sheet of coarse material and a facing ribbon of fine material helically secured thereon with its edges united.

30 4. A cylindrical phonogram of impressible material comprising a backing strip wound helically into a tube and a facing

strip wound helically in the opposite direction and secured on the backing with the edges united.

5. A cylindrical phonogram comprising a 35 strip or ribbon of impressible material wound into a helix with its edges united and a sound record on the outer face thereof.

6. A cylindrical phonogram comprising a 40 backing sheet and a facing of impressible material helically secured thereon with its edges united and a sound record on the outer face thereof.

7. A cylindrical phonogram comprising a 45 backing sheet of coarse material, a facing ribbon of fine impressible material helically secured thereon with its edges united and a sound record on the outer face thereof.

8. A cylindrical phonogram of impressible material comprising a backing strip 50 wound helically into a tube and a facing strip wound helically in the opposite direction and secured to the backing with the edges united and a sound record on the outer face thereof.

55 In testimony whereof I, have affixed my signature in presence of two witnesses.

FRANK COLSEN APPLGATE.

Witnesses:

CHARLES S. ACKLEY,
HOWARD F. LUPTON.

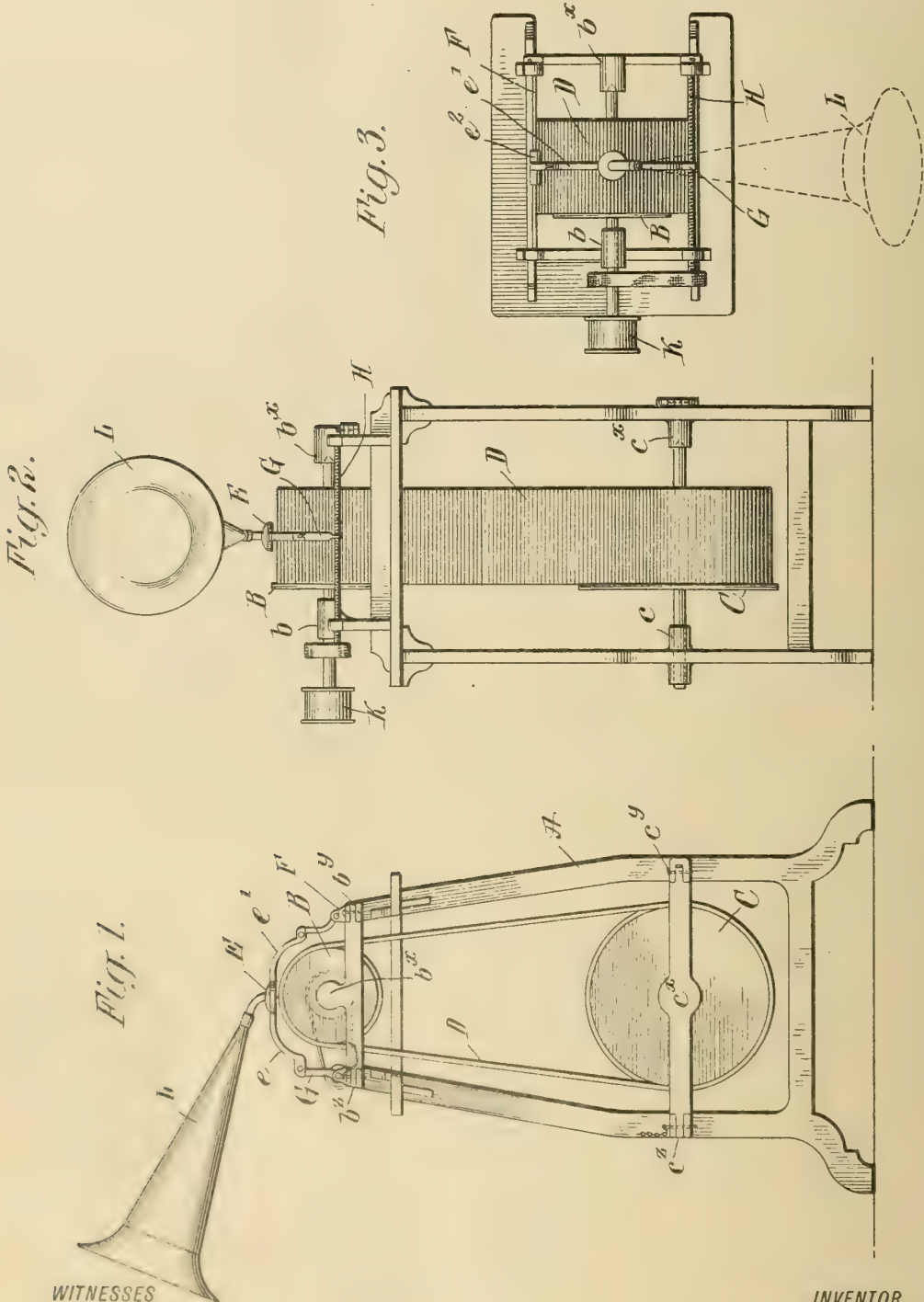
F. E. HOLMAN.

PHONOGRAPH.

APPLICATION FILED DEC. 22, 1908.

939,692.

Patented Nov. 9, 1909.



WITNESSES

Samuel E. Wade
Lester A. Stanley

INVENTOR
FRANK E. HOLMAN.

BY *Munn & Co.*

ATTORNEYS

UNITED STATES PATENT OFFICE.

FRANK E. HOLMAN, OF SILVERTON, OREGON, ASSIGNOR OF ONE-HALF TO JOHN E. INNIS, OF SILVERTON, OREGON.

PHONOGRAPH.

939,692.

Specification of Letters Patent.

Patented Nov. 9, 1909.

Application filed December 22, 1908. Serial No. 463,815.

To all whom it may concern:

Be it known that I, FRANK E. HOLMAN, a citizen of the United States, and a resident of Silvertown, in the county of Marion and State of Oregon, have made certain new and useful Improvements in Phonographs, of which the following is a specification.

My invention relates to improvements in means for increasing the available recording surface in phonographs, and it consists in the constructions, combinations and arrangements hereinafter described and claimed.

An object of my invention is to provide a phonograph in which a record surface of a flexible nature and having a relatively great length may be inserted or removed, and in which the bearing members for the cylinder are pivoted to admit the removal or replacement of the record.

A further object of my invention is to provide a record applicable to a cylinder type, in which the virtual diameter of the record is greatly increased, while the actual diameter is not.

Other objects and advantages will appear in the following specification and the novel features of the invention will be particularly pointed out in the appended claims.

My invention is illustrated in the accompanying drawings, in which—

Figure 1 shows an end view of a phonograph containing one embodiment of my invention. Fig. 2 shows a side view thereof, and Fig. 3 is a plan view.

In carrying out my invention I provide a frame A in which is supported the upper feed roller B having a flange b^x on one end and a lower roller C, having a similar flange c^x . These rollers are journaled in the bearings b and b^x and c and c^x , respectively, carried by the uprights of the frame A. The bearings b and c are elongated as shown in Fig. 2 in order to support their respective shafts when the cone bearings B^x and C^x are removed from the ends of the shaft. The cone bearings b^x and c^x are hinged to one of the uprights of the frame A at b^x and c^x , respectively, and may be locked at the opposite ends b^x and c^x , as clearly shown in Fig. 1. This construction is for the purpose of enabling the assembling of these cylinders and also for slipping on the flexible record D.

The flexible record D is preferably an endless band composed of any suitable material

which will permit a bending of the band or belt, such as the films of moving picture machines. A belt may be coated with a composition which will permit the making and keeping of the phonographic record. The belt may be made of any size and of a length corresponding to the height of the frame A. A longer belt would be used with a correspondingly higher frame, thus giving a greater record surface. The belt may be of any width, but in practice I find it preferable to use a belt with a virtual diameter of thirty-six inches and a width of six inches on a feed cylinder of approximately five inches in diameter. After the belt is slipped on, the slack may be adjusted to the proper degree by a movement of the upper part of the frame relatively to the lower or by a movement of the bearings of one of the rollers. The roller C may be of any convenient diameter and serves merely as an idler.

The diaphragm E may be any standard diaphragm and is preferably supported by means of the arms e and e' . The arm e' is provided with a guide sleeve e^2 arranged to travel back and forth on the guide rod F. The arm e on the opposite side is provided with a feed member G arranged to cooperate with a feed screw H. The feed roller B may be driven by means of a belt (not shown) running over a drive pulley K, by any suitable power. The diaphragm may be provided with the usual horn or sound intensifier L.

From the foregoing description of the various parts of the device the operation thereof may be readily understood. When the machine is assembled in the manner already indicated and the needle is placed at one edge of the continuous band, the rotation of the feed cylinder 5 will cause the belt 9 to move under the needle and the action of the feed screw will cause the needle to be shifted longitudinally of the belt. It will thus be seen that with a feed cylinder, say of five inches diameter, the effect of an endless belt traveling over said cylinder will be that of a cylinder of a virtual diameter equaling that of the belt, thereby giving a much larger record surface without much increase in the feed cylinder. Of course the feed screw H may be made to advance the needle transversely of the belt, *i. e.* longitudinally of the feed cylinder at any predetermined rate. By using a record belt of a virtual diameter

of thirty-six inches with ninety-six threads upon the feed screw for every inch in length of the feed cylinder (or width of the belt), we will obtain a record having a length approximately sixteen times the length of the ordinary cylinder record. Used at the same record speed of the ordinary cylinder machine, it will require nearly fifty-eight minutes time to reproduce this record.

10 In the effort to make phonographs of comparatively small size but with large record surface for use in connection with motion pictures, it will be at once apparent that this device furnishes a means for overcoming the
15 obstacles in connection with the recording, or rather reproduction, of long speeches to correspond with, or accompany, the actions of the characters in the motion pictures. So also an opera of considerable length may be
20 recorded by means of a machine equipped with my invention.

While I have shown this device as consisting of a frame of a special form, it will be understood that any frame suitable for the
25 purpose may be used and that it may be made of iron or wood or other appropriate material. I am also aware that other forms of the device based upon the same general idea might be made but I consider as my
30 own and desire to claim all such modifications as fairly fall within the spirit and scope of the invention.

I claim -

1. In a phonograph, a frame, a feed roller
35 arranged in one end of said frame, an idler

arranged in the other end of said frame, hinged bearings for said feed roller and said idler, a flexible recording surface carried by said feed roller and said idler, said recording surface consisting of an endless belt 40 arranged to run on both of said rollers, and a stylus arranged to engage said recording surface.

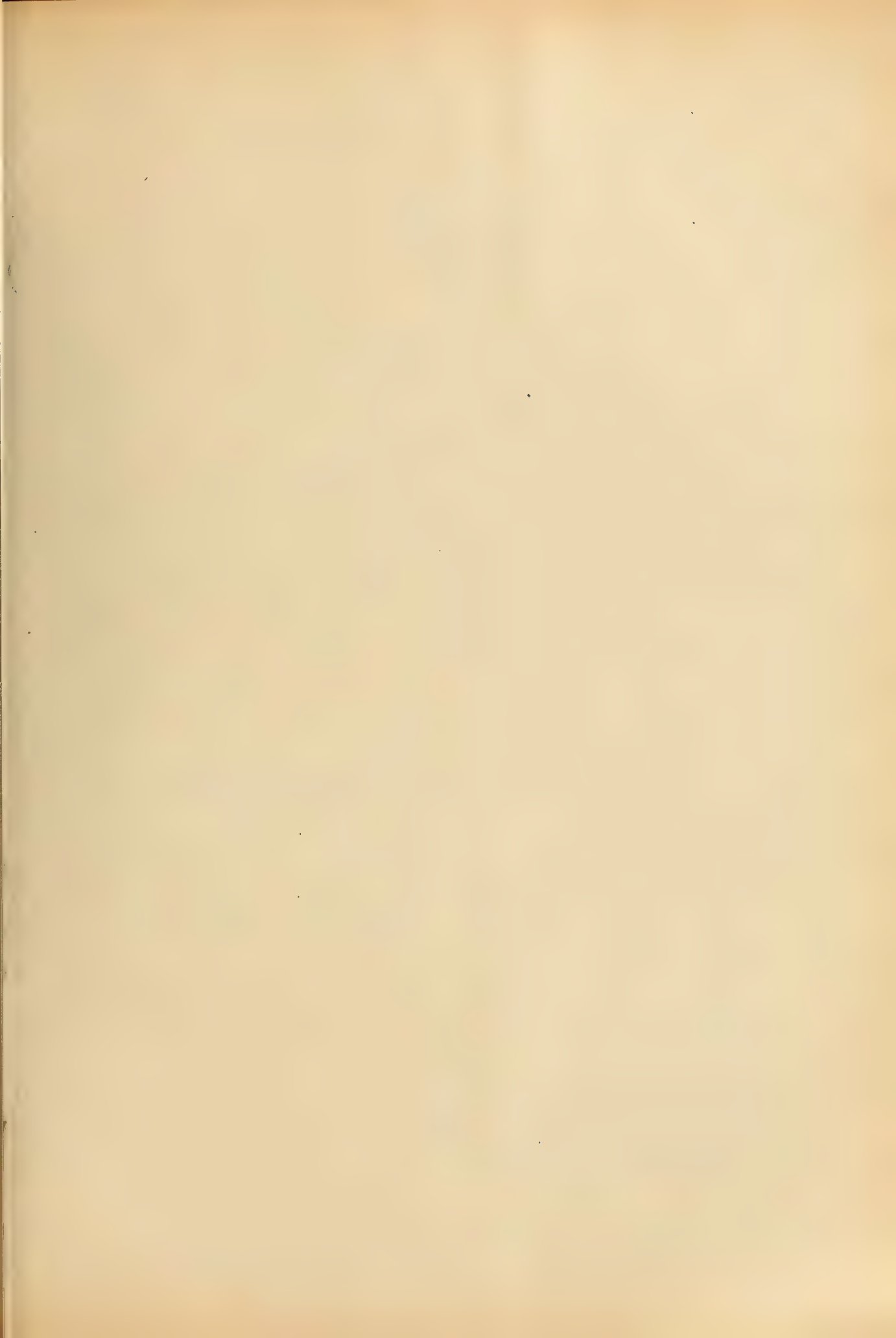
2. In a phonograph, a frame provided with upper and lower stationary bearings, a 45 feed roller mounted in said upper bearings, an idler mounted in said lower bearings, upper and lower hinged bearings carried by said frame and arranged to swing into alignment with the respective upper and lower 50 stationary bearings and a flexible recording surface carried by said rollers.

3. In a phonograph, a frame provided with upper and lower stationary bearings, a 55 shaft having a guide flange on the end of the roller adjacent the stationary bearing, a lower shaft journaled in said lower stationary bearing, an idler carried by said lower shaft and provided with a flange on the end adjacent the stationary bearing, and upper 60 and lower hinged bearings carried by said frame and arranged to swing into alignment with their respective stationary bearings and adapted to engage the ends of the upper and lower shafts respectively.

FRANK E. HOLMAN.

Witnesses:

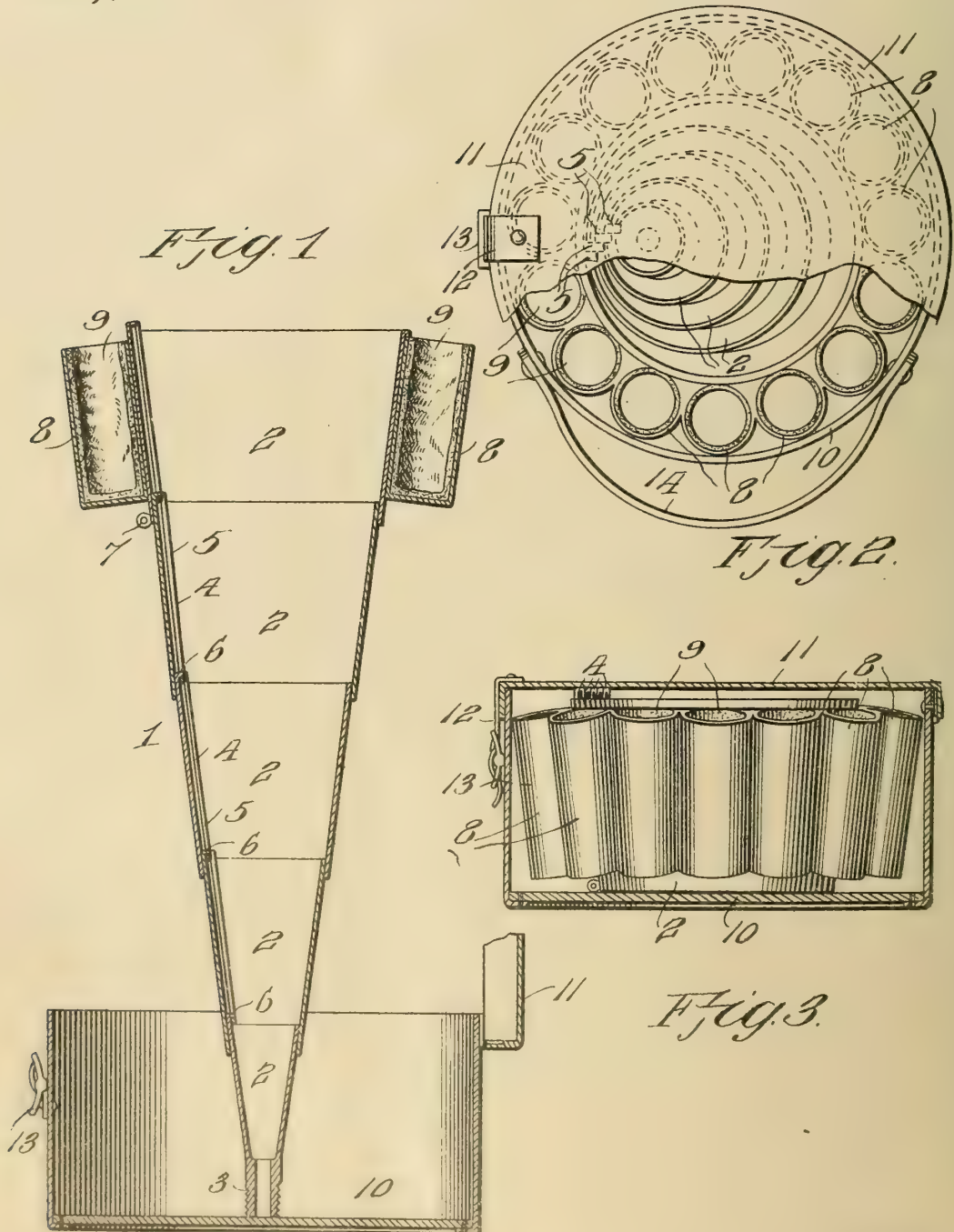
C. F. WEBB,
P. L. BROWN.



W. SMITH.
 COMBINED GRAPHOPHONE HORN AND RECORD CASE.
 APPLICATION FILED JUNE 15, 1909.

939,753.

Patented Nov. 9, 1909.



Witnesses
 Frank Hough
 C. C. Hines.

Inventor
 Walter Smith,
 By Victor J. Evans
 Attorney

UNITED STATES PATENT OFFICE.

WALTER SMITH, OF VIROPA, WEST VIRGINIA.

COMBINED GRAPHOPHONE-HORN AND RECORD-CASE.

939,753.

Specification of Letters Patent.

Patented Nov. 9, 1909.

Application filed June 15, 1909. Serial No. 502,306.

To all whom it may concern:

Be it known that I, WALTER SMITH, a citizen of the United States, residing at Viropa, in the county of Harrison and State of West Virginia, have invented new and useful Improvements in a Combined Graphophone-Horn and Record-Case, of which the following is a specification.

This invention relates to a combined graphophone horn and record case, the object of the invention being to provide a collapsible horn composed of telescopic sections, the outer section carrying means for supporting a series of records, together with a case or receptacle in which the collapsed horn and records are adapted to be stored for ready and convenient transportation.

The invention consists of the features of construction, combination and arrangement of parts hereinafter fully described and claimed, reference being had to the accompanying drawing, in which:—

Figure 1 is a vertical longitudinal section through the graphophone horn and case embodying my invention, showing the horn arranged in position for removal or collapse. Fig. 2 is a top plan view of the horn and records stored within the casing, the cover of the latter being partially broken away. Fig. 3 is a sectional view through the closed casing, showing the parts stored therein.

Referring to the drawing, the numeral 1 designates the horn, which is of ordinary flaring form and composed of a series of any desired number of telescopic sections 2, the innermost or reduced section being provided with a threaded nipple 3 for detachable connection with the sound box of the reproducing mechanism of the graphophone. Each of the sections, except the said innermost or reduced section, is provided with a guide member 4 consisting of a folded strip of material bent downwardly from its outer edge and provided with a longitudinal guide slot 5, the guide slot of the strip of each section receiving a tongue or projection 6 formed upon the section which telescopes therein. These guide connections between the sections insure a true inward and outward movement thereof in opening and collapsing the horn and the end walls of their slots serve as stops coacting with the projections 6 to limit the in and out movements of the sections and to prevent their withdrawal one from the other.

The sections are adapted to collapse in the

manner shown in Figs. 2 and 3, wherein all the inner sections are shown as folding within the outermost section, thus enabling the horn to be collapsed in close compass for storage and to be readily and conveniently elongated for use.

The outermost or enlarged section 2 is provided with the usual eye 7 for connection with a suspending device or brace forming a part of the machine, and is provided with an annular series of holders 8 to receive a corresponding number of graphophone cylinders or records 9, which holders may be formed of any suitable material and fixed in any preferred manner to the said outermost horn section.

The collapsed horn carrying the holders and records surrounding the same, as shown in Figs. 2 and 3, is adapted to fit within a carrying case 10, preferably of cylindrical form and of a size to snugly receive the same, and made of leather or other suitable material. This casing is provided with a hinged lid or cover 11 which may be secured in closed position in any suitable manner, as by providing it with a strap 12 to engage a buckle 13 on the casing, which latter is provided with a handle 14 by means of which it may be conveniently handled and carried.

From the foregoing description, it will be seen that my invention provides a horn which may be collapsed in close compass and stored within a casing for ready transportation, and which is provided with means for holding a plurality of records adapted to be stored therewith in the casing, so that the horn and a number of records may be carried within a single receptacle, the advantages and conveniences of which will be manifest.

Claims.

1. A graphophone horn comprising a series of collapsible sections, and record holding means carried by one of said sections.
2. A graphophone horn comprising a series of telescopic sections, and record holding means surrounding one of said sections.
3. A graphophone horn comprising a series of telescopic sections, and a record holder embodying a series of record receptacles grouped about the larger section.
4. A graphophone horn provided with record holding means.
5. A graphophone horn provided with an annular series of record holders.
6. A graphophone horn comprising a se-

ries of telescopic sections, guiding connections between the sections, and a record holder carried by the largest section.

7. The combination of a casing, a horn composed of telescopic sections adapted to fold therein, and a record holder carried by the largest section and adapted to be stored therewith in said casing.

8. A collapsible graphophone horn pro-

vided upon one of the sections thereof with 10 a series of record holders.

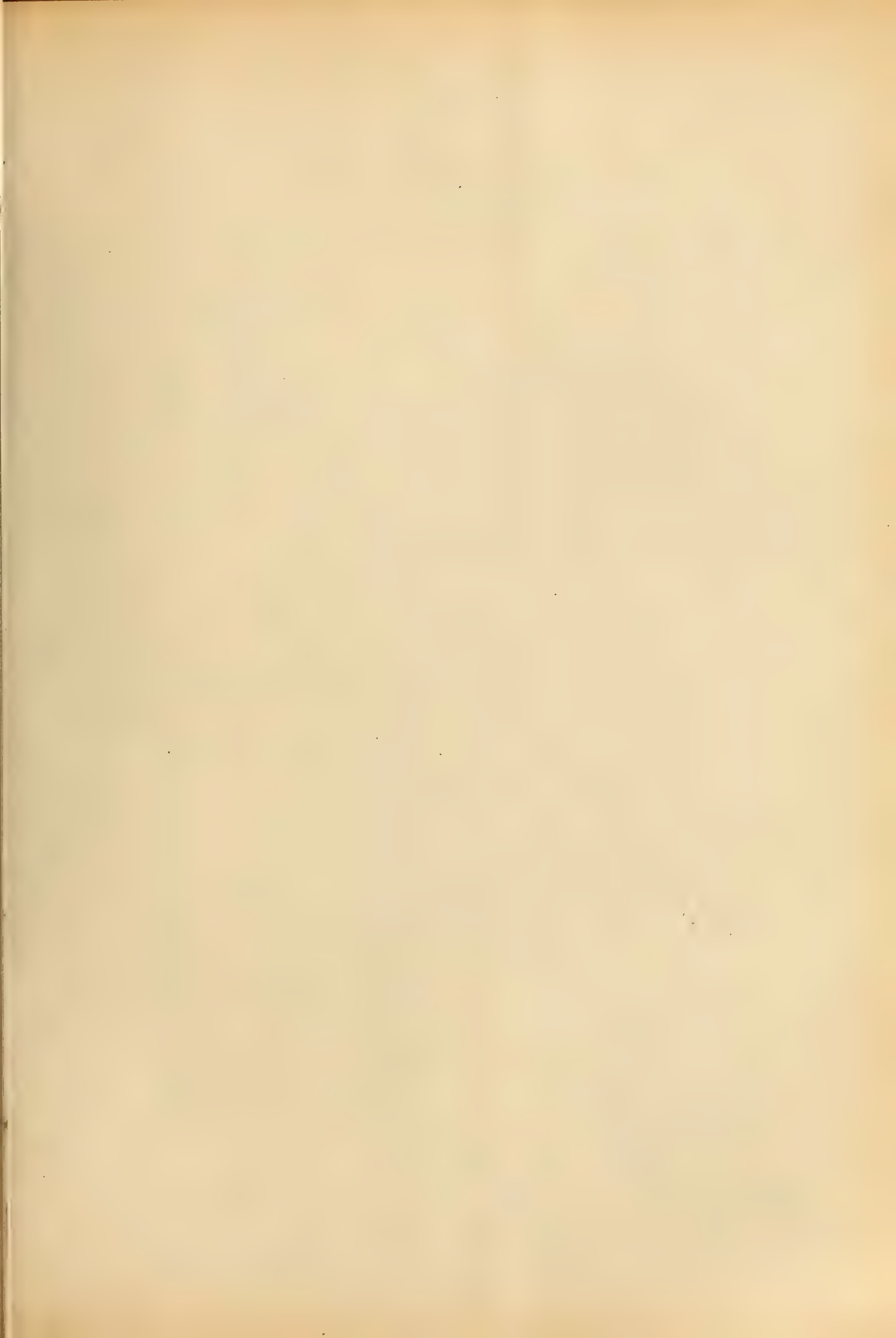
In testimony whereof I affix my signature in presence of two witnesses.

WALTER SMITH.

Witnesses:

PINKNEY HESS,

C. T. PICKET.



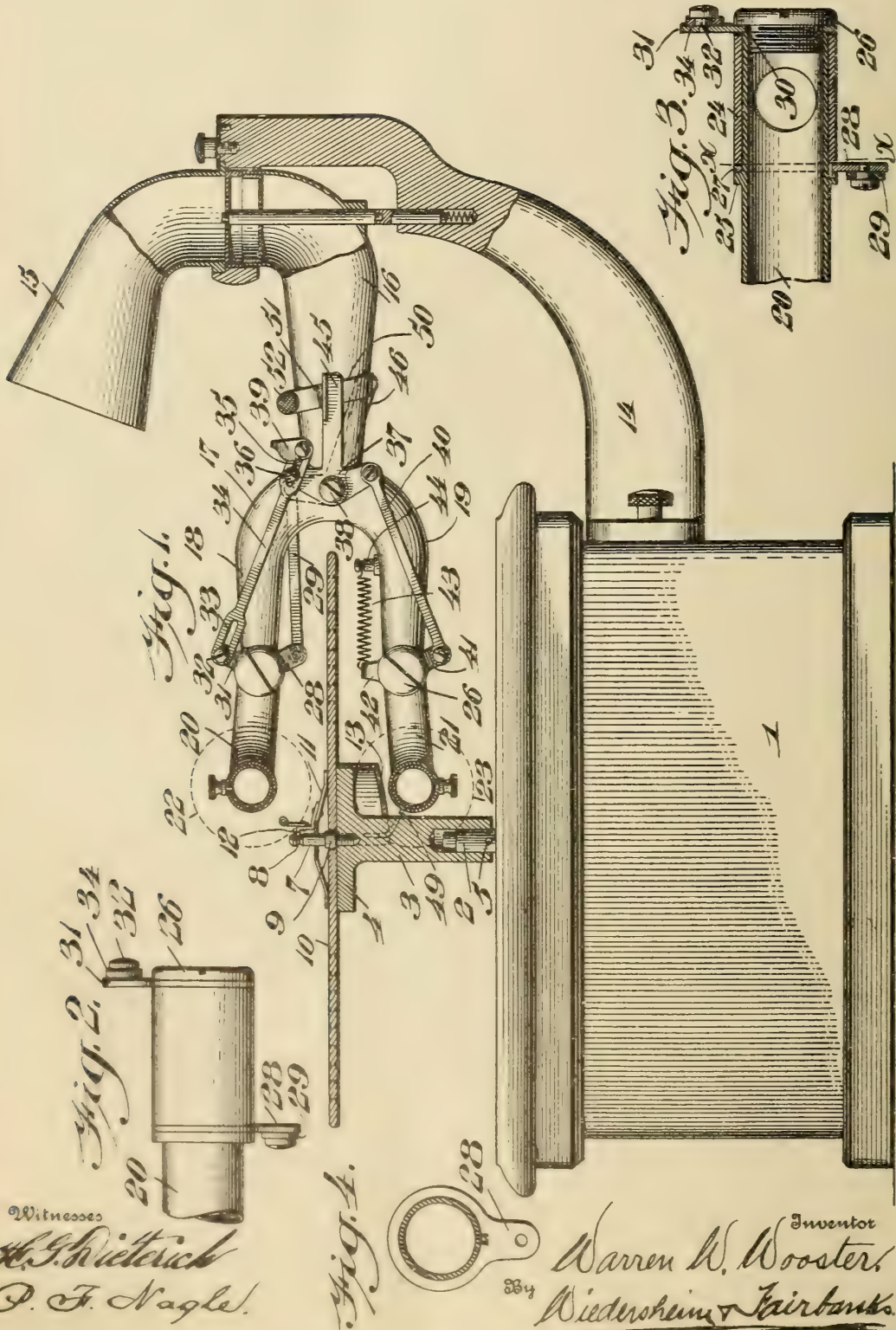
W. W. WOOSTER.
TALKING MACHINE.

APPLICATION FILED MAR. 2, 1908.

939,781.

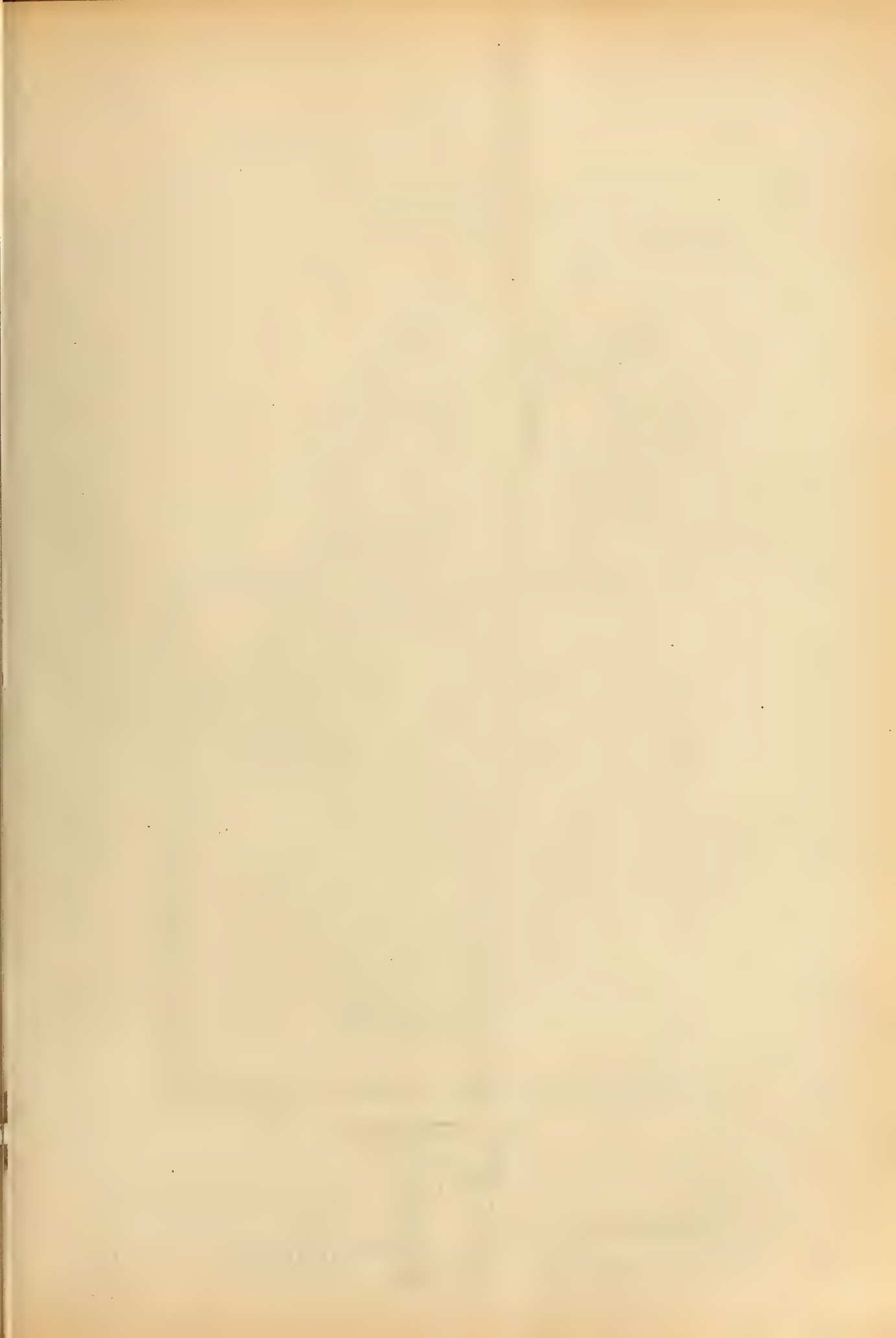
Patented Nov. 9, 1909.

6 SHEETS—SHEET 1.



Witnesses
H. S. Dietrich
D. F. Nagle.

Inventor
Warren W. Wooster.
Wiedersheim & Fairbanks.
Attorneys



W. W. WOOSTER.
TALKING MACHINE.
APPLICATION FILED MAR. 2, 1908.

Patented Nov. 9, 1909.
6 SHEETS—SHEET 2.

939,781.

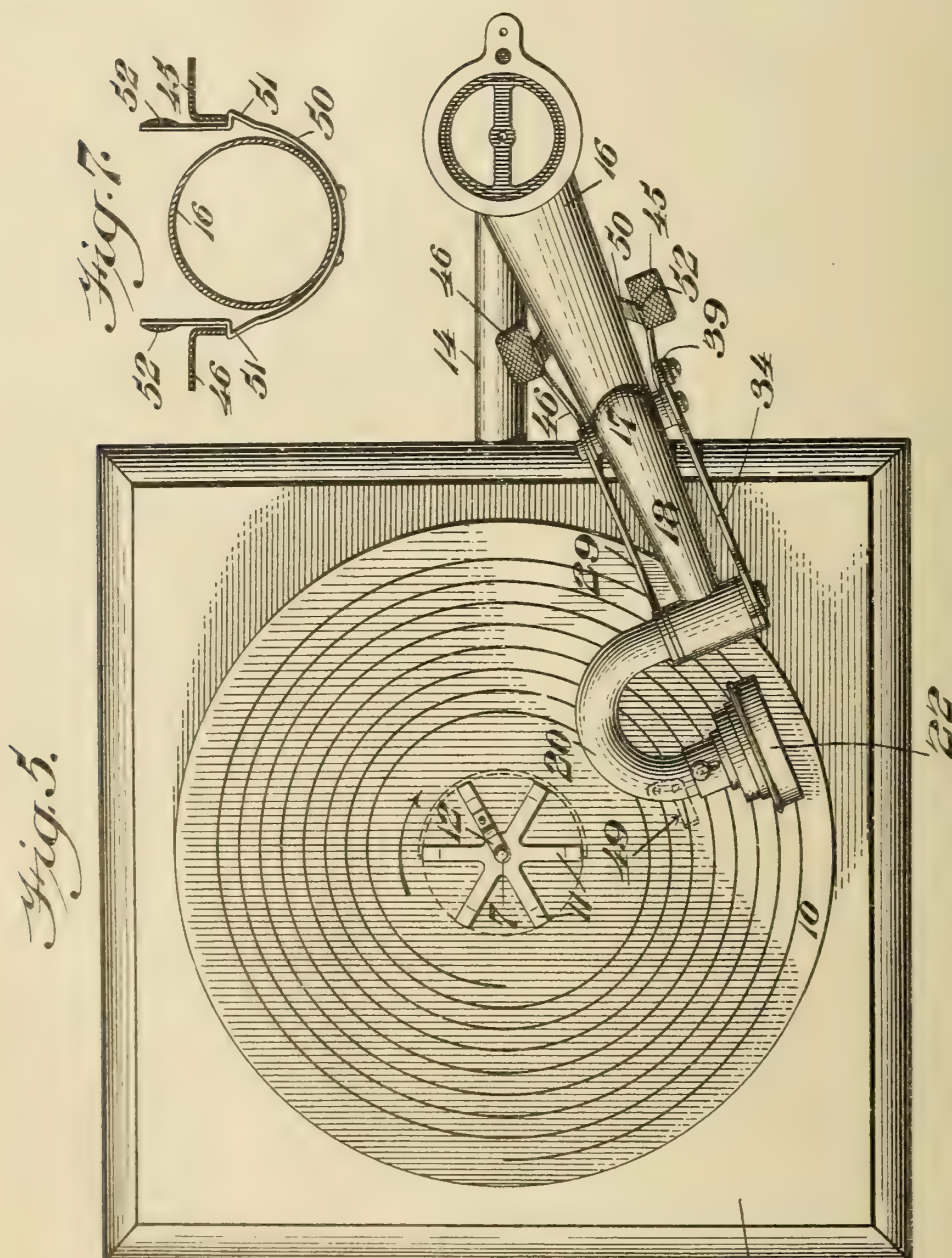


Fig. 5.



Fig. 7.



Fig. 6.

Witnesses
H. S. Wierich
P. F. Nagle.

Inventor
Warren W. Wooster.
By Wiedersheim & Witkowski.

Attorneys



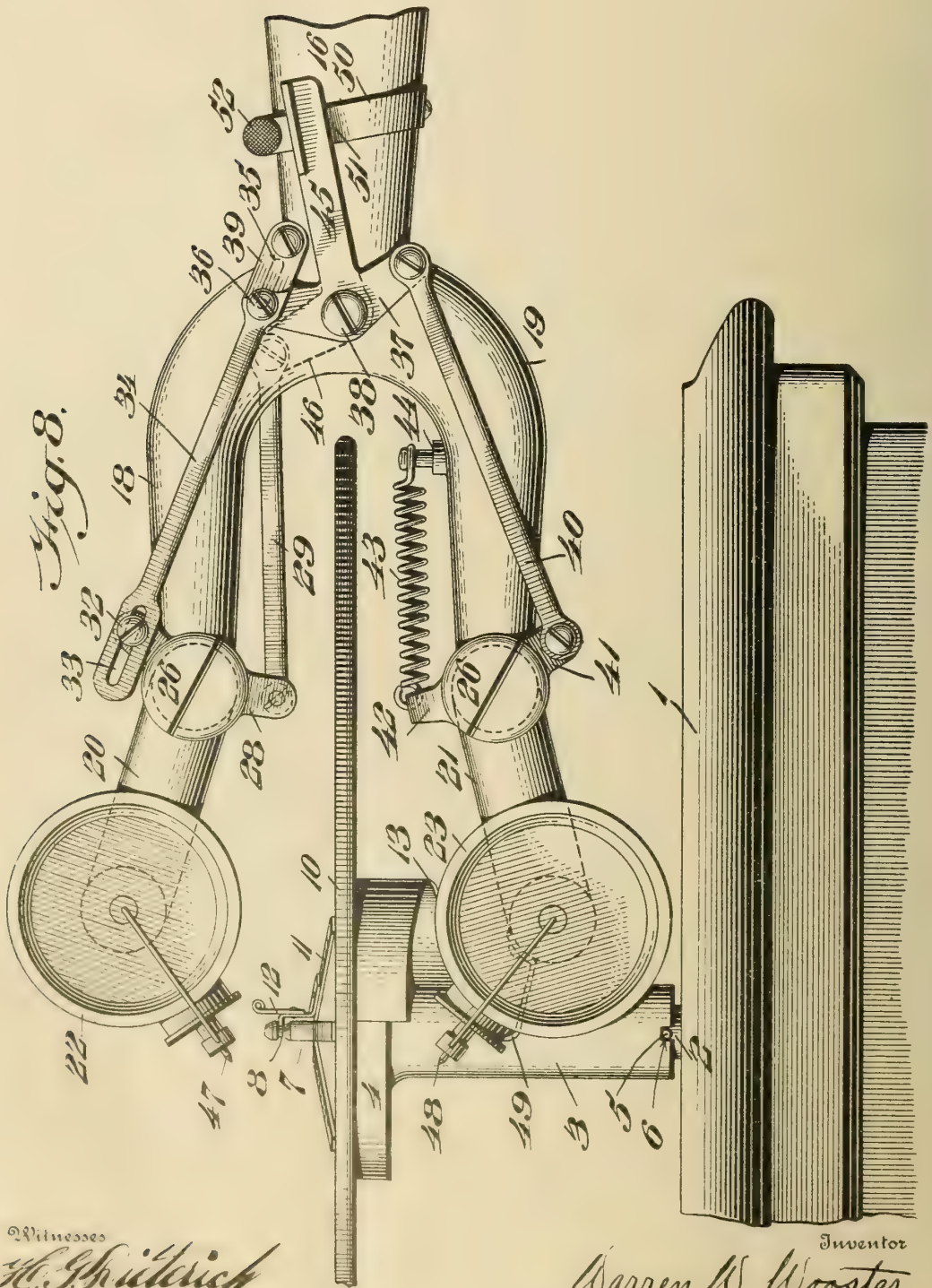
W. W. WOOSTER.
TALKING MACHINE.

APPLICATION FILED MAR. 2, 1908.

Patented Nov. 9, 1909.

6 SHEETS—SHEET 3.

939,781.



Witnesses
H. G. Hülrich
P. F. Nagel

Inventor
Warren W. Wooster.
By *Wiedersheim & Fairbanks.*
Attorneys

W. W. WOOSTER.

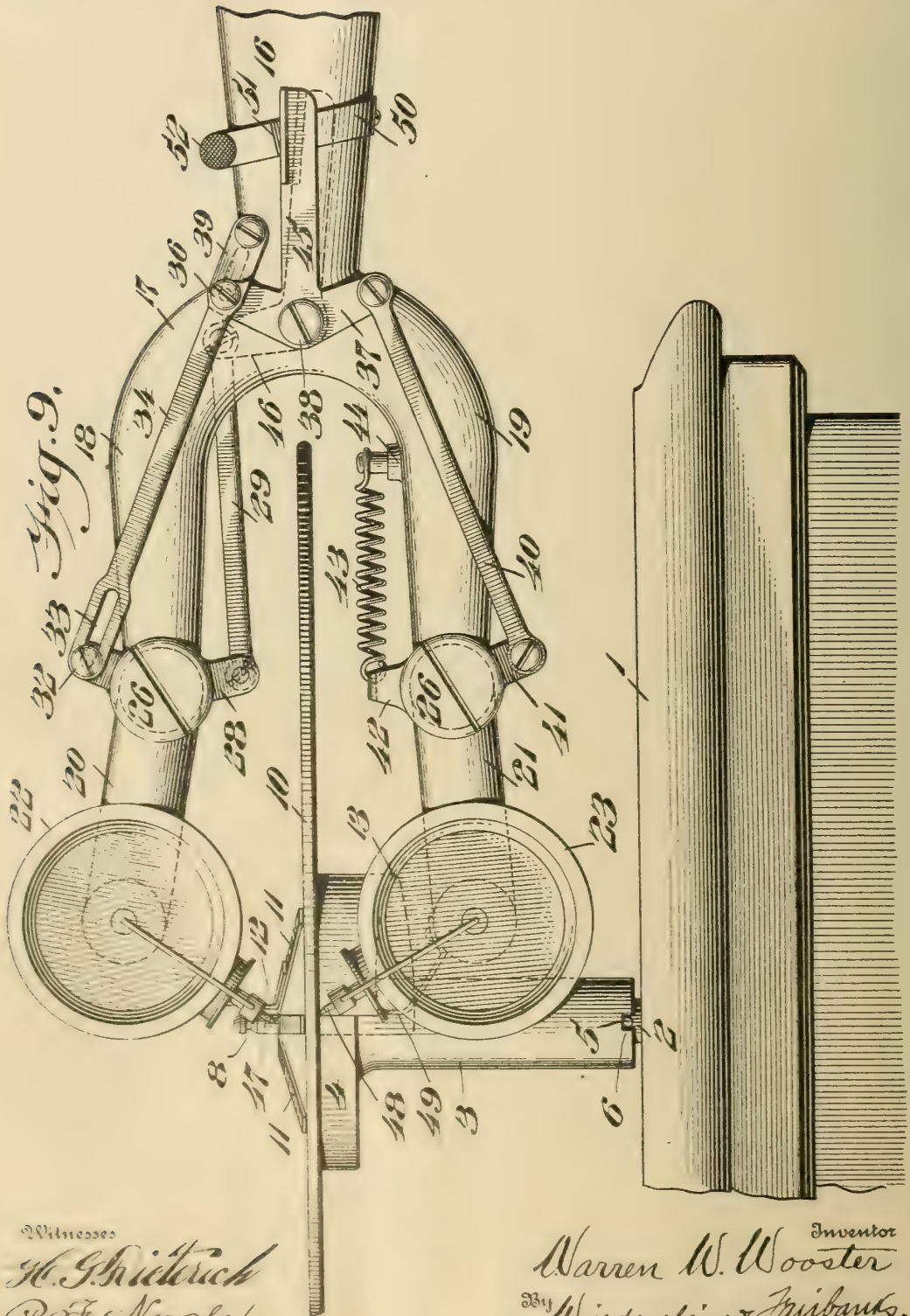
TALKING MACHINE.

APPLICATION FILED MAR. 2, 1908.

Patented Nov. 9, 1909.

6 SHEETS—SHEET 4.

939,781.



Witnesses
H. G. Richter
P. F. Nagle

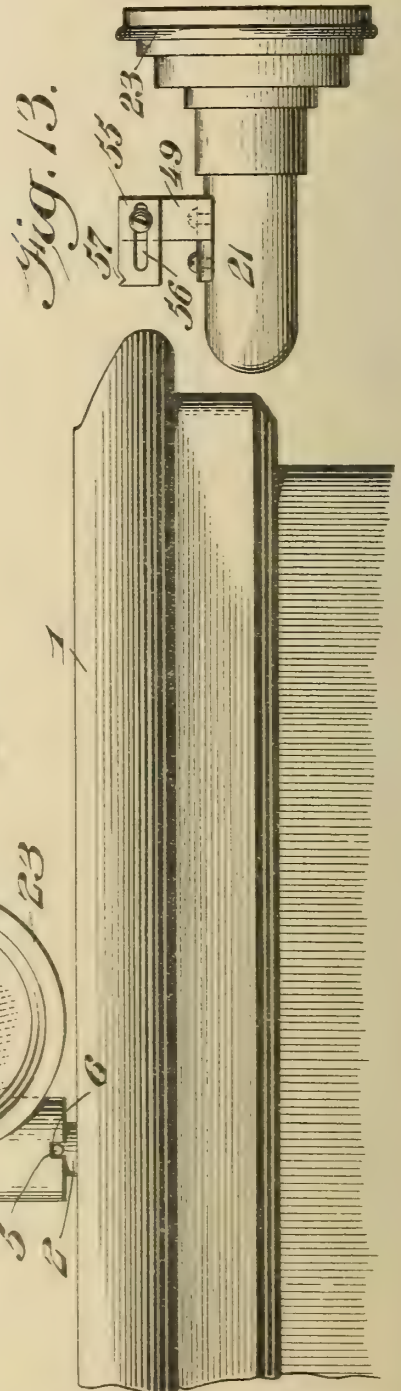
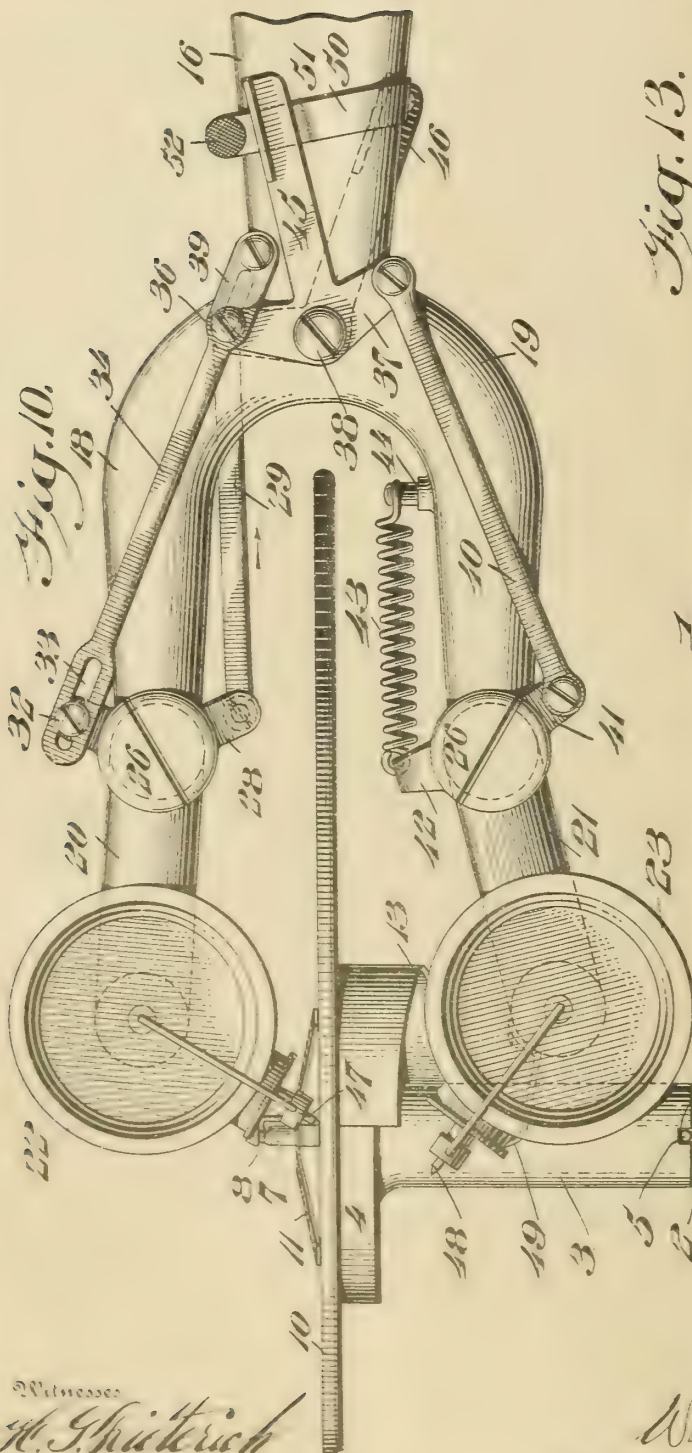
Inventor
Warren W. Wooster
By Wiedersheim & Fairbanks,
Attorneys



W. W. WOOSTER.
TALKING MACHINE.
APPLICATION FILED MAR. 2, 1908.

939,781.

Patented Nov. 9, 1909.
6 SHEETS—SHEET 5.



Witnesses
H. G. Hütten
P. F. Nagel

Inventor
Warren W. Wooster.
By Wiedersheim & Fairbank
Attorneys

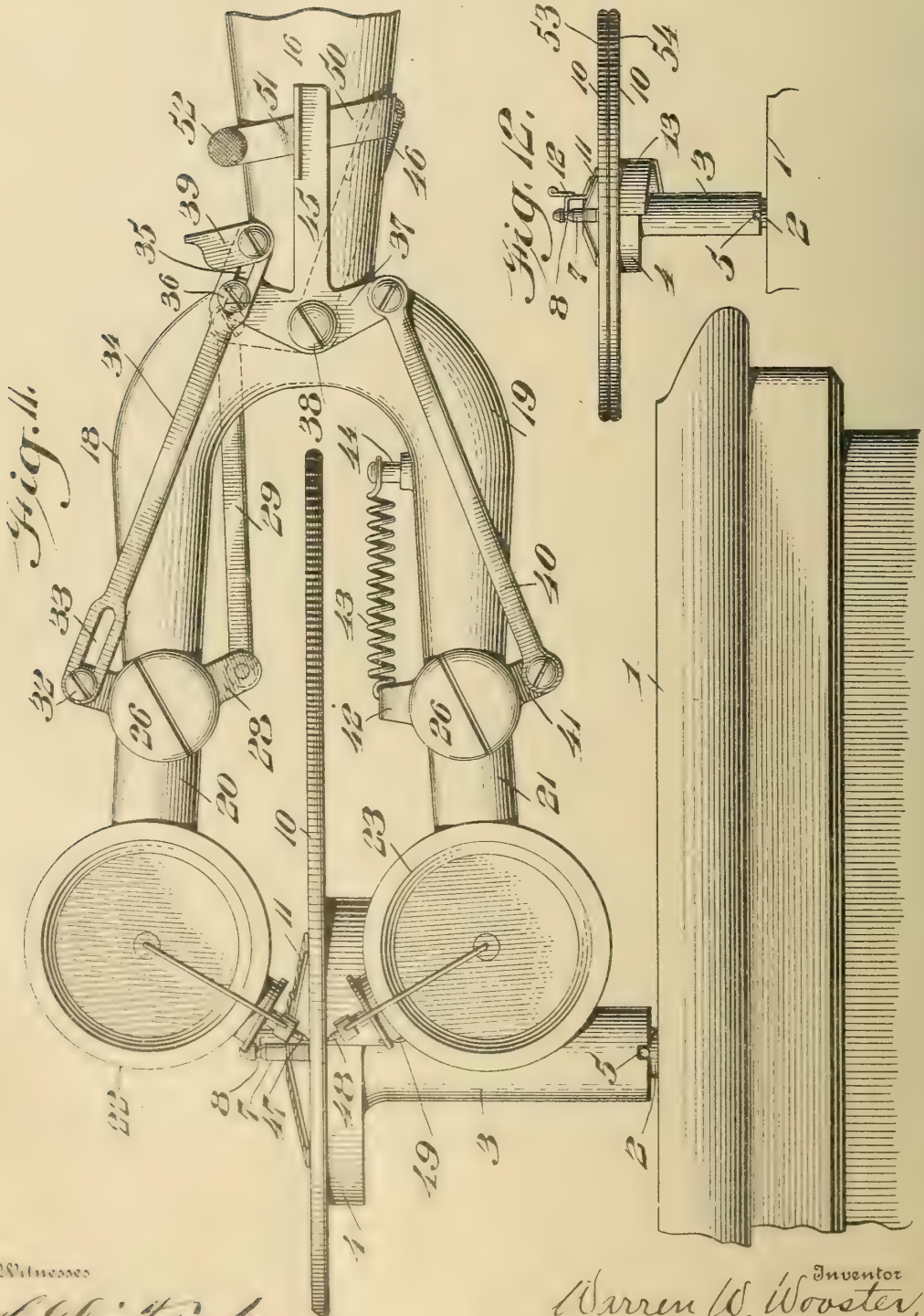
W. W. WOOSTER.
TALKING MACHINE.

APPLICATION FILED MAR. 2, 1908

Patented Nov. 9, 1909.

6 SHEETS—SHEET 6.

939,781.



Witnesses

H. J. Hütterich.
D. F. Nagel.

Inventor
Warren W. Wooster.
By *Wiedersheim Paulbank*
Attorneys

UNITED STATES PATENT OFFICE.

WARREN W. WOOSTER, OF BERLIN, NEW JERSEY.

TALKING-MACHINE.

939,781.

Specification of Letters Patent.

Patented Nov. 9, 1909.

Application filed March 2, 1908. Serial No. 418,829.

To all whom it may concern:

Be it known that I, WARREN W. WOOSTER, a citizen of the United States, residing at Berlin, in the county of Camden, State of New Jersey, have invented a new and useful Talking-Machine, of which the following is a specification.

My invention relates to a new and useful talking machine and consists in providing two sound boxes and stylus holders with means whereby one or the other of said sound boxes and styli are caused to contact with a record.

It further consists in providing means whereby one of the sound boxes and styli may be placed into contact with the record upon one side thereof and at the proper time will be thrown out of contact therewith and the other stylus and sound box will be thrown into operative position.

It further consists of other novel features of construction, all as will be hereinafter fully set forth.

Figure 1 represents a partial elevation and partial sectional view of a talking machine embodying my invention. Fig. 2 represents a front elevation of a portion of the connecting mechanism for the yoke and the sound box holder. Fig. 3 represents a vertical sectional view thereof. Fig. 4 represents a sectional view on line $x-x$, Fig. 3. Fig. 5 represents a partial plan view with the horn attachment removed, of the device shown in Fig. 1. Fig. 6 represents in elevation, a view of the lower connecting mechanism for the yoke and sound box holder. Fig. 7 represents a sectional view showing the catches employed. Fig. 8 represents a side elevation of a portion of the device showing both of the sound boxes and stylus holders out of engagement with the record. Fig. 9 represents a side elevation showing the lower stylus in operative position with the upper stylus holder out of contact with the record. Fig. 10 represents a side elevation showing the lower sound box and stylus out of contact with the record and the upper sound box and stylus in operative position. Fig. 11 represents a side elevation showing both needles and styli in engagement with the record on opposite sides thereof. Fig. 12 represents in elevation, a portion of a talking machine showing two records in position. Fig. 13 represents an elevation of a portion of the device.

Similar numerals of reference indicate corresponding parts in the figures.

Referring to the drawings, the talking machines or sound reproducing apparatus now upon the market are limited to the use of a single record, the length of which is limited to the size of the record and further in musical selections in which there is a difference in the quality of the sounds, as in a solo and accompaniment, the sounds which differ in their composition, timbre, rate of vibration and amplitude of the sound waves, etc., are recorded in one record. This record is not a true record, due to the modified vibration of the recording diaphragm. Its vibration is the resultant of the mutual action of, in this particular case, two sound waves which impinge thereon and produce a record which when reproduced modifies the characteristics of each and their pure tone qualities are to a great extent destroyed. The above defect is also very pronounced in orchestral selections to such an extent that it is found impossible, due to the complexed nature of the sound waves, to make a record which will not give discord and reproduce correctly all the instruments thereof. For this reason only the most prominent instruments are recorded, the others are intentionally omitted. My talking machine or sound reproducing apparatus is designed to overcome these defects and in the drawings, I have shown a construction which will operate successfully but it will be apparent that changes may be made in the parts and the arrangement of the same may be varied and other instrumentalities may be employed which will accomplish the same results and I do not, therefore, desire to be limited in every instance to the exact construction as herein shown and described but desire to make such changes as may be necessary.

1 designates the usual motor casing of a talking machine from which projects the shaft 2, which is adapted to be rotated by the motor in the casing. Removably connected in any desired manner with the shaft 2 is a spindle 3, having a head 4 thereon, said spindle in the present instance being connected with the shaft by means of a pin 5 carried by the shaft coacting with the recess 6 in the spindle 3, by means of which it will be seen that the spindle rotates with the shaft in the proper manner.

In suitable engagement with the spindle 3 is a pin 7 provided with a groove or neck 8, it being understood that said pin 7 is adapted to pass the usual opening 9 in the sound record or tablet 10 in order that the said record may be properly positioned upon the spindle 3 and will be suitably carried by the head 4.

In order to properly hold and lock the sound record 10 in position thereon, I provide the spider 11 which may have any desired number of fingers adapted to bear upon the face of the sound record and I provide a tooth 12 at a suitable point upon the spider, which is adapted to be seated in the groove or neck 8 of the pin 7 in order that the parts will be locked with respect to each other, it being understood that the sound record is seated upon the spindle 3, the pin 7 passing through the opening 9, after which the spider 11 is placed in position and the tooth 12 caused to engage with the groove or recess 8. In order to remove the same, the tooth 12 is removed from engagement, after which the spider can be removed and the record taken off and replaced by another, if desired. The head 4 of the spindle 3 is of suitable size in order not to interfere with the spiral grooves of the record and at a suitable point upon the spindle 3, I provide a cam face 13, for purposes to be hereinafter described.

At one side of the casing 1 is secured or projects, a bracket or arm 14 which is preferably similar in shape to those now in use and which is provided with any suitable means for carrying or having connected therewith the bell portion 15, which may either be a portion of the amplifying horn or may have the amplified horn connected therewith. The bracket 14 also serves to carry the sound boxes and has movably and suitably connected therewith the tube portion 16 from which projects the yoke 17 formed of the arms 18 and 19, each of which communicate with the said tube portions 16 and each of said arms 18 and 19 carrying the off-set or semicircular tubes 20 and 21 respectively, with which the sound boxes 22 and 23 respectively are connected. Said tubes 20 and 21 have a vertical movement with respect to the arms 18 and 19 and may be jointed or connected therewith in any desired manner. In the present instance, I preferably provide the ring 24 on the ends of each of the arms 18 and 19 and upon the off-sets 20 and 21, I provide a shoulder 25 so that when the screw 26 is properly connected therewith, the parts are firmly held but permit the vertical turning of the off-sets 20 and 21. Seated between the ring 24 and the shoulder 25, I provide a washer or collar 27, which has an arm 28 projecting therefrom, with which is pivotally connected a link 29, while between the ends of the ring 24 and

the head of the screw 26, I provide a washer 30 having a projection or arm 31 carrying a headed pin 32. Said pin is movable in a slot 33 formed in the bar 34, which has a slot 35 at its opposite end, said slot having a screw 36 therein, which screw is carried by one arm of the elbow lever 37, which is pivoted at 38 to a suitable point, in the present instance, to the yoke 17.

Pivotally connected with the arm 34 is the lock or catch 39 for purposes to be hereinafter described. Pivotally connected with the other arm of the elbow lever 37 is a link 40 which is pivotally connected with the lug 41 mounted and supported with respect to the off-set arm 21 in a manner similar to that in which the lug 31 is connected with the off-set 20, said lug 41 through the medium of its washer having an ear 42 projecting over the opposite side of the screw 26 with which is connected a spring 43, the opposite end of which is connected with the stud 44 stationarily supported. Projecting from the elbow lever 37 is an arm 45 for operating the same. The link 29 is pivotally connected with an arm 46 which is pivotally supported by the yoke 17, in the present instance. The sound boxes 22 and 23 are carried by the off-sets 20 and 21 and connected therewith in any desired or well known manner each of said sound boxes having the usual means for supporting a needle or stylus 47 and 48 respectively.

Carried by the lower off-set 21 is a finger 49 which supports the strip 55 having a slot 56 cut in it for adjusting the same. The said strip 55 has a V-cut 57 which is adapted to engage with the beveled edge 58 of the cam 13 in order to hold the horn arm 16 steady so that there will be no horizontal movement while the cam 13 is depressing the off-set 21 and with it the sound box 23 and needle 48, it being understood that said cam 13 is so situated as to depress the parts when the record on the lower face of the sound record has been completed.

50 designates a spring catch which is suitably carried by the tube portion 16, said catch being provided with the shoulders 51 which are adapted to engage with the arm 45 and bar 46 in order to hold the same in position with the needles out of engagement with the records, it being understood that by compressing the ends 52 of the spring, the arms are released from engagement with the shoulders 51 for the operation of the parts.

It will be understood that by means of my device, I am enabled to employ two sound records or a double faced record and that I may play the record upon the lower face by causing the needle in the lower sound box to contact therewith and can automatically remove the needle of the lower sound box and throw in the needle of the upper sound box so that I am enabled to make a record play

continuously for double the length of time of the ordinary talking machine, or I can cause both of the needles to contact with spiral grooves on the upper and lower faces of the records so that both will be played at the same time, thus enabling me to play a solo part on one side with the accompaniment upon the other, the advantages of which are apparent, thus giving to each a separate and clear and distinct individual reproduction which is produced from a true record. The number of instruments in an orchestra selection can be increased by recording the soprano horn and instruments of a similar nature which have a high rate of vibration and a small amplitude of sound wave on one side and the bass horn and instruments of a similar nature which have a lower rate of vibration and a longer amplitude of sound wave upon the other, thus grouping them according to their characteristics and also reproducing them at the same time, thus increasing the number of instruments and giving a fuller and better reproduction.

The operation of the device is as follows:—The sound record 10 having been placed in position as before described, the two sound boxes 22 and 23 having been placed in the position seen in Fig. 8, the catch 39 having been thrown down to prevent the pin 36 from sliding in the slot 33, and the elbow lever 37 will be thrown to its position, as seen in said Fig. 8, by elevating the arm 45, which throws the said elbow lever 37 into such a position that the link 40 causes the off-set 21 to rotate upon its joints and lower the sound box 23, the pin 32 sliding in the slot 33, as will be evident, at the same time the arm 46, which is also elevated, will act through the link 29 to raise the sound box 22. The arms 45 and 46 are now released from their catches 50 and the action of the spring 43 raises the arm 21 and sound box 23 which causes the needle 48 thereof to be brought into contact with the spiral groove on the lower face of the record 10 while the pin 32 is caused by the gravitational effect of the sound box 22 and off-set 20 to bear upon the end of the slot 33 which thereby holds the off-set 20 and incidentally the needle 47 away from the upper surface of the record, the parts being in the position as seen in Fig. 9. The motor having been started, the shaft 2 will be rotated and with it the spindle 26 rotating the record 10 and as the needle 48 is in contact with the groove, the sound will be reproduced from the lower face of the record. As soon as the strip 35 has been carried in with the off-set 21 a suitable distance, it will contact with the beveled edge 38 of the cam 43 forcing down the sound box 23 and the off-set 21, which will remove the needle 48 from contact with the groove in the record and will at the same

time actuate the elbow lever 37 and catch the arm 45 thereof with the catch 50 and hold it in the position as seen in Fig. 10, and as the catch 39 is in proper position, no movement of the link 31 on the pin 36 is permitted so that said link 34 will throw down the off-set 20 and cause the needle 47 carried by the sound box 22 to be brought into contact with the groove in the upper face of the sound record 10, causing the same to reproduce the sound therefrom, as will be evident, it being understood that the needle 47 bears upon the record 10 by the action of gravity of the parts 22 and 20, this being permitted by the slot 33 which allows the movement of the pin 32 therein. In this way it will be seen that I am enabled to produce the sound from the groove upon the upper and lower faces respectively of the sound record 10, the playing of the same being continuous and thus practically doubling the time for the playing of a record which permits a much longer record being made and reproduced. The records which are now in existence can also be used on this device, since the same can be placed upon the spindle 3 and suitably supported thereon and operated thereby and the upper needle 47 with its sound box 22 can be brought into proper engagement with the spiral groove thereon by placing the parts in the position seen in Fig. 10, which of course entirely throws out of operation the lower sound box 23. Should it be desired, however, to play both spirals upon a double record or have two records placed upon the spindle 3, this can be accomplished by raising the catch 39 in the position as seen in Fig. 11 and releasing the arms 45 and 46 from their respective catches 51. This will cause the upper needle 47 to come by gravity into contact with the upper face of the record 10, or if there are two records employed in contact with the spiral groove upon the upper record, while the spring 43 causes the off-set 21 to be elevated carrying sound box 23 therewith and causing the needle 48 of the same to contact with the spiral groove in the lower face of the record, or if there are two records the spiral groove with the lower record. In this way both needles are reproducing at the same time, whereby many different effects may be produced, which has heretofore been impossible, it being understood that the lowering of the sound box 22 is permitted by reason of the slot 33 permitting movement of the pivotal pin 36 of the arm 31. The arms 45 and 46 being out of engagement with the catch 50 do not in any way interfere with the vertical motion of the sound boxes 22 and 23 and allow the needles 47 and 48 thereof to adjust themselves to the record.

In the construction shown in Fig. 12 I have shown a portion of the talking ma-

chine in use with two records 53 and 54, the spiral grooves being made upon the proper faces thereof in order that the stylus of the proper sound box can be brought into proper contact therewith in order to reproduce, it being understood that the spiral grooves in these two records are turning in such a manner as to properly operate in conjunction either as a continuation, one with the other or to be played together as in the case of a double faced record.

From the above it will be seen that my device is adapted for use with oppositely facing sound records which provide for the rendition, as before stated, of a more extended composition continuously than can be played upon a single faced record or if the records have no connection with one another and are entirely different selections, I avoid the time and trouble of changing the records after the first has performed.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:—

1. In a talking machine, a plurality of sound boxes, and means operated by the movement of the machine for automatically moving said sound boxes alternately one toward and the other away from a record.

2. In a talking machine, a record support, a plurality of sound boxes actuated to contact with different sound grooves and means operated by the movement of the machine for actuating said sound boxes alternately.

3. In a talking machine, a plurality of sound boxes, a record support holding a record above the path of one sound box and means operated by the movement of the machine for actuating said sound boxes alternately to bring the same into operative position.

4. In a talking machine, a plurality of sound boxes, means for causing the needle of one sound box to contact with the spiral groove of a record and for holding the other sound box out of contact position, and means for actuating the first mentioned sound box for removing the needle thereof out of engagement with the spiral groove and for actuating said holding means to cause the needle of the second mentioned sound box to be brought into contact with a spiral groove of a record.

5. In a talking machine, a plurality of sound boxes, means for causing the needle of one sound box to contact with the spiral groove of a record and for holding the other sound box out of operative position, and a cam face for removing the needle of the first mentioned sound box out of engagement with the spiral groove and for actuating said holding means to cause the needle of the second mentioned sound box to be brought into contact with a spiral groove of a record.

6. In a talking machine, a plurality of sound boxes, means for supporting the same but permitting vertical movement thereof, an elbow lever suitably supported, links connected with said elbow lever and with said sound boxes, and a catch for locking one of said links whereby the movement of one sound box will cause the movement of the other.

7. In a talking machine, a plurality of sound boxes, means for supporting the same but permitting vertical movement thereof, an elbow lever suitably supported, links connected with said elbow lever and one of said links connected with one sound box, the other with the other sound box, a catch for locking one of said links with respect to said elbow lever, whereby the movement of one sound box will actuate the other, said catch being adapted to be thrown out of engagement with said links whereby both sound boxes may be brought into contact with different spiral grooves on a record.

8. In a talking machine, a plurality of sound boxes, a reproducing stylus carried by each of said sound boxes, oppositely faced sound records carried by said machine, and means operated by movement of the machine for causing said styli to contact alternately with said sound records.

9. In a talking machine, a plurality of sound boxes, a reproducing stylus carried by each of said boxes, oppositely facing sound records carried by said machine, means on the machine causing one stylus to contact with one of said records and for holding the other out of engagement with the other sound record.

10. In a talking machine, a plurality of sound boxes, a reproducing stylus carried by each of said boxes, oppositely facing sound records carried by said machine, means for causing one of said stylus to contact with one of said records and for holding the other out of engagement, and means for automatically throwing out of contact the first mentioned stylus and throwing the second mentioned stylus into contact with the other sound record.

11. In a talking machine, a plurality of sound boxes, a reproducing stylus carried by each of said boxes, oppositely facing sound records carried by said machine, a lever pivotally supported, a link connected with said lever and with one of said sound boxes, a second link connected with said lever and the other of said sound boxes, and a cam face for actuating one of said sound boxes to remove the same from contact with its sound record and remove the other sound box into contact with its sound record.

12. In a talking machine, a plurality of sound boxes, a reproducing stylus carried by each of said boxes, oppositely facing sound records carried by said machine, a lever piv-

totally supported, a link connected with said lever and with one of said sound boxes, a link connected with the other of said sound boxes and with said lever, the connection of said link being a movable one, and a catch for preventing movement of the connection between said link and said lever.

13. In a sound reproducing apparatus, a traveling tablet having a sound record formed on both sides, a reproducing stylus shaped for engagement with one of said records and free to be vibrated and propelled by the same, a reproducing stylus shaped for engagement with the other record and free to be vibrated and propelled by the same, and means for causing one of said styli to be brought into engagement with one of said records and automatically removed therefrom, and for causing the other stylus being brought into engagement with the other record.

14. In a talking machine, a record, a plurality of sound reproducers located on opposite sides of said record, and means to move said reproducers successively to contact with said record.

15. In a talking machine, a record, a plurality of sound reproducers located on opposite sides of said record, and automatic means to move said reproducers successively to contact with said record.

16. In a talking machine, a record, a plurality of sound reproducers located on opposite sides of said record, and automatic means

to move said reproducers successively to contact with the record, and means for throwing said automatic means out of operation, whereby both of said reproducers may be brought into contact with said record.

17. In a talking machine, a record, a plurality of sound reproducers located on opposite sides of said record, automatic means to move said reproducers successively to contact with the record, means for throwing said automatic means out of operation, and means for causing both of said sound reproducers to be brought into contact with said record.

18. In a machine of the class set forth, a rotatable record disk having similar sound records upon its opposite faces, automatic means for successively reproducing sound from said records, and a common outlet for the sounds reproduced from each of said records.

19. In a machine of the class set forth, a rotatable record disk having similar sound records upon its opposite faces, automatic means for successively reproducing sound from said records, the lines of the sound records on the opposite sides of said record disk running in the same direction, and a common outlet for the sounds reproduced from each of said records.

WARREN W. WOOSTER.

Witnesses:

JAMES C. COOPER,
WALTER HEIMBERGER.



1771

1772

1773

1774

1775

1776

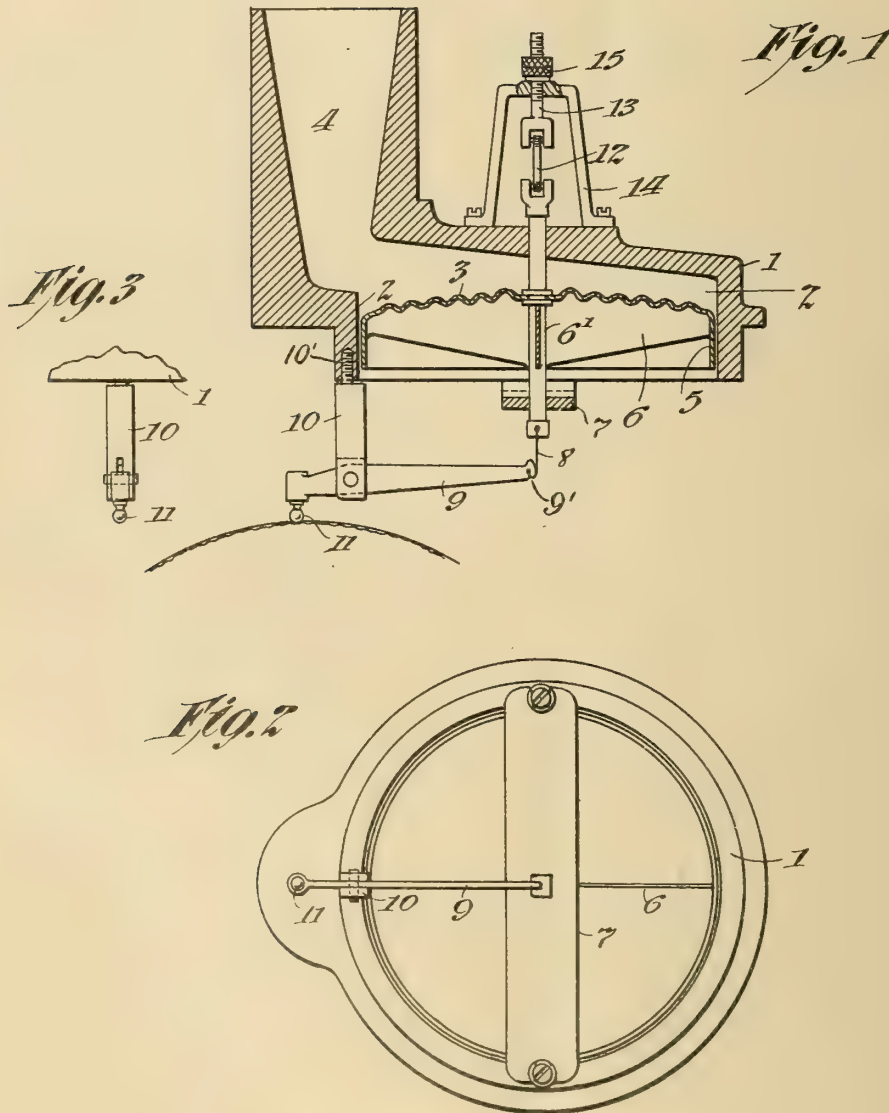
1777

1778

T. A. EDISON.
 PHONOGRAPHIC RECORDING AND REPRODUCING MACHINE.
 APPLICATION FILED MAR. 16, 1907.

939,992.

Patented Nov. 16, 1909.



Witnesses:
 Frank D. Lewis
 Delos Holden

Inventor:
 Thomas A. Edison
 by Frank L. Ryan
 Atty.

UNITED STATES PATENT OFFICE.

THOMAS A. EDISON, OF LLEWELLYN PARK, ORANGE, NEW JERSEY.

PHONOGRAPHIC RECORDING AND REPRODUCING MACHINE.

939,992.

Specification of Letters Patent.

Patented Nov. 16, 1909.

Application filed March 16, 1907. Serial No. 362,596.

To all whom it may concern.

Be it known that I, THOMAS ALVA EDISON, a citizen of the United States, and a resident of Llewellyn Park, Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Phonographic Recording and Reproducing Mechanism, of which the following is a description.

In an application for Letters Patent Serial No. 362,597 filed on even date herewith, I describe and claim certain improvements in phonographic recording and reproducing mechanism, in which I make use of a vibrating piston which connects with the stylus lever and wherein an independent tension device is employed for maintaining the stylus in engagement with the recording or record surface. I point out in said application the advantages of a vibrating piston as compared to a diaphragm, and I illustrate two specific forms of devices embodying the new improvements, one form, specifically claimed therein, employing a compensating weight so that the fulcrum of the stylus lever will be always maintained in proper relation to the record surface notwithstanding mechanical variations or eccentricities therein, and the other employing no compensating weight as may be done if the surface is fairly true. I propose in the present application to describe and claim the device embodying the said improvements in which the compensating weight is dispensed with.

In the accompanying drawing forming part of this specification—Figure 1 is a vertical sectional view of a reproducing mechanism embodying my improvements; Fig. 2, a bottom view of the same, and Fig. 3, a detail view of the hinge connection between the stylus lever and the casing.

In the above views corresponding parts are represented by the same reference numerals.

The casing 1 is made preferably of aluminum, and is formed with a bore 2 turned as true as possible, and in which works the vibrating piston 3. Leading from the casing 1 is a passage 4 which connects with the usual horn. The piston 3 is made preferably of metallic magnesium so as to be as light as possible, and is formed with a convexed, corrugated main portion, with a depending flange 5 as shown, and preferably with three or four radial ribs 6, cemented in place, so as to be very stiff. It fits very closely with-

in but does not touch the bore 2 (say within .0005 of an inch) so that it vibrates freely but practically no opportunity is offered for loss of air pressure around its edges. Connected with the center of the piston 3 is a light magnesium or aluminum tube 6¹ which is guided by bearings in the casing and in a bridge piece 7, so as to center the piston within the bore 2. The lower end of the tube 6¹ is connected to the stylus lever 9 by means of a very flexible steel band 8 which passes around the curved end of the stylus lever and is inserted and firmly held in a slot 9¹ therein. The tendency of the spring 8 to straighten out maintains the parts in a state of tension. The stylus lever 9 is fulcrumed within the depending lug or finger 10, secured to the casing 1 by a swivel connection at screw 10¹ as shown, so as to permit the stylus 11 to track the record even when the groove is slightly out of line as is generally the case under commercial conditions.

A spring 12 is connected to the upper end 80 of the tube 6¹ so as to keep the stylus always in engagement with the record or recording surface. Since the piston 3, as compared to a diaphragm, is capable of movements of relatively enormous amplitude, the spring 12 will keep the stylus in its proper engagement with the record, notwithstanding variations that would be fatal if a diaphragm were used without a compensating weight. The upper end of the spring, which is shown 90 as a small rubber band, connects with a rod 13 movable in a yoke 14 and adjusted by nuts 15 so that the tension of the spring may be properly regulated as desired. The tension of the spring 12 exerts a constant 95 stress on the connections between the piston and the stylus lever, and also on the fulcrum of the stylus lever, so as to prevent lost motion or rattling of the parts. The stylus 11 is mounted on the lever preferably nearer 100 its fulcrum than is the free end of the lever, so that the vibrations of the stylus will be correspondingly amplified at the piston, and the latter can therefore be vibrated through a relatively great amplitude so as to obtain 105 loud reproductions.

Having now described my invention, what I claim as new and desire to secure by Letters Patent, is as follows:

1. In phonographic recording or reproducing apparatus, the combination with a casing, a vibrating piston freely movable

therein, a stylus lever having a fixed pivot, a stylus mounted thereon, connections between the said lever and one face of the piston, and a spring device attached to the other face of the piston and the casing for maintaining the stylus in engagement with the recording or record surface, substantially as set forth.

2. In phonographic recording or reproducing apparatus, the combination with a casing, a vibrating piston freely movable therein, a stylus lever having a fixed pivot, a stylus thereon, connections between the stylus lever and the piston including a tension device, a second tension device for maintaining the stylus in engagement with the recording or record surface, and means for adjusting the latter tension device, substantially as and for the purposes set forth.

3. In phonographic recording or reproducing apparatus, the combination with a casing, a vibrating piston freely movable therein, a stylus lever having a fixed pivot, a stylus thereon at one side of the pivot, connections between the stylus lever on the other side of the pivot and the piston, and maintaining the stylus in engagement with the record surface, and adjusting means for the tension device, a tension device exerting upward stress on the piston and through said connections on the end of the stylus lever remote from the stylus, and thus maintaining the stylus in engagement with the record surface, substantially as set forth.

4. In phonographic recording or reproducing apparatus, the combination with a casing, a vibrating piston freely movable

therein, a stylus lever having a fixed pivot, a swivel for said pivot, a stylus on the stylus lever, connections between the lever and piston, and a tension device mounted above the said piston and exerting an upward pull on the same, for maintaining the stylus in engagement with the record or recording surface, substantially as set forth.

5. In phonographic recording or reproducing apparatus, the combination with a casing, a vibrating piston freely movable therein, a stylus lever having a fixed pivot and having a curved forward end, a stylus mounted on the stylus lever near its other end, a spring encircling the curved end of the stylus lever, and secured to the stylus lever and to the piston, and a tension device for maintaining the stylus in engagement with the record or recording surface, substantially as and for the purposes set forth.

6. As a new manufacture, a vibrating piston for phonographic recording or reproducing apparatus made of sheet metal, formed with a corrugated convex body and with its periphery turned down all around to form a depending flange adapted to fit within a cylindrical bore, said piston also being provided with radial ribs, extending substantially at right angles to the general surface of the piston, substantially as and for the purposes set forth.

This specification signed and witnessed this 25th day of February 1907.

THOMAS A. EDISON.

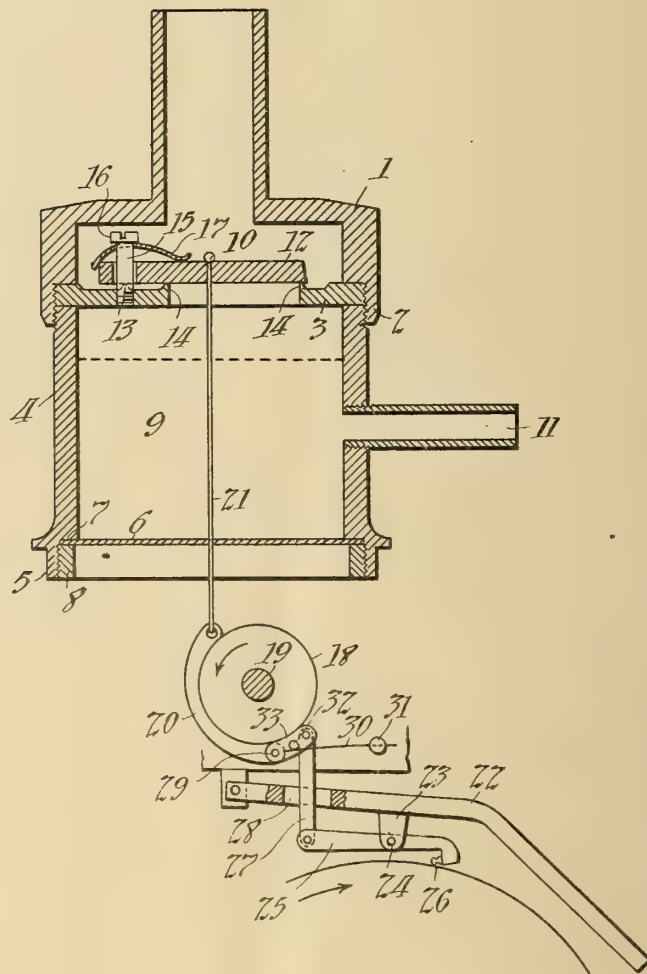
Witnesses:

FRANK L. DYER,
FRANK D. LEWIS.

A. N. PIERMAN.
SOUND REPRODUCER.
APPLICATION FILED MAR. 20, 1909.

940,051.

Patented Nov. 16, 1909.



Witnesses:
Frank D. Lewis
Dyer Smith

Inventor:
Alexander N. Pierman
by Frank L. Dyer
Atty.

UNITED STATES PATENT OFFICE.

ALEXANDER N. PIERMAN, OF NEWARK, NEW JERSEY, ASSIGNOR TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

SOUND-REPRODUCER.

940,051.

Specification of Letters Patent.

Patented Nov. 16, 1909.

Application filed March 20, 1909. Serial No. 484,789.

To all whom it may concern:

Be it known that I, ALEXANDER N. PIERMAN, a citizen of the United States, and a resident of Newark, in the county of Essex
5 and State of New Jersey, have made a certain new and useful Improvement in Sound-Reproducers, of which the following is a specification.

My invention relates to sound reproducers
10 of the type wherein the rate of flow of elastic fluid through the ports of a valve situated between chambers in a sound box is varied in accordance with the movements
15 of the reproducing stylus tracking a sound record, whereby the current of the fluid is thrown into vibrations corresponding in form to those which were originally caused by the production of sound in the formation
20 of the original record, but which are of greater amplitude than the original vibrations causing an amplified reproduction of the said sounds.

The object of my invention is to provide a device of this character in which an even
25 greater amplification of the sounds in the reproduction thereof is attained by the combination with the above described means for varying the rate of flow of the elastic fluid through the valve, of co-acting friction
30 means and lever means.

In my Patent No. 891,367, granted June 23, 1908 for improvements in sound reproducers, I have disclosed an apparatus wherein the principle of the variation of rate
35 of flow of air or other elastic fluid through the ports of a valve is made use of to amplify the reproduced sounds. Also, in my Patents Nos. 829,123, granted August 21, 1906, for frictional reproducing attachments
40 for phonographs, 847,686, granted March 19, 1907 for phonic apparatus, and 867,597, granted October 8, 1907 for friction reproducing attachment for phonographs, I have disclosed various apparatus of the type
45 wherein a rotating friction wheel is used in combination with a friction shoe placed against the same, the pressure between the friction shoe and the friction wheel being varied by suitable means representative of
50 sound vibrations, thus producing variations in the amount of friction, which by suitable mechanical connections may operate a diaphragm or other phonic apparatus.

In my present invention, the variations in
55 the amount of friction between the co-acting

friction members are caused by suitable means to regulate the amount of opening of the valve seated on a port or a series of ports through which a steady current of air or other elastic fluid is progressed, whereby
60 the reproduction of sound with considerable amplification is attained.

Attention is hereby directed to the accompanying drawing embodying a preferred form of my invention and consisting in a
65 diagrammatic side elevation of the device partly in section.

Referring to the drawing, 1 represents a sound box provided with the threaded depending annulus 2. In this the circular plate
70 3, constituting the valve seat and formed on its periphery with screw thread, is secured. The cylinder 4 carrying screw thread on the upper portion of its periphery is screwed
75 within the ring 2, so that its upper edge is brought into contact with the lower surface of the ring 3, whereby the sound box 1, the valve seat ring 3 and the cylindrical member 4 are rigidly secured together. The
80 cylinder 4 is formed at its lower end with the depending annular flange 5, which is screw threaded on its bore. The circular plate 6 is placed in position under the shoulder 7, formed by the meeting of the flange
85 5 with the body portion of the cylinder 4, and is rigidly secured in such position by the ring 8, which is threaded within the flange 5 to secure the plate 6 in position rigidly
90 against the shoulder 7. The plate 6 thus constitutes a closure, whereby a pressure chamber 9 is formed, the sound box 1 forming a resonating chamber 10 of less dimensions than the pressure chamber 9 and separated therefrom by the valve seat 3 and
95 valve to be described. Air or other elastic fluid is conducted to the pressure chamber 9 by means of the connection 11, which is threaded or otherwise secured within the wall of the chamber 9 to form an opening
100 therein. The valve 12 is seated upon the ports formed in the plate 3 in any suitable manner. As shown in the drawing, the valve 12 is mounted to have pivotal movement upon the knife edge 13, the valve also,
105 when in its closed position, resting upon the edges of the ports 14-11. The bolt 15 is threaded in the plate 3 and projects through a vertical opening in the valve 12. The bolt 15 is provided with a head 16 against
110 which rests the flat spring 17, the two ends

of which bear upon the top valve plate 12, the pressure of said spring thereby being exerted to maintain the valve plate 12 upon its seat.

5 The friction wheel indicated diagrammatically at 18 is mounted upon the spindle 19 and is adapted to be constantly rotated by any suitable means not here shown. Suitable means for causing this rotation are described in several of my patents above referred to. Brake shoe 20 partly surrounds friction wheel 19 and is connected at one end thereof by link 21 with the valve plate 12. This link 21 passes through a suitable opening in closure 6 and the link is conveniently secured to the valve plate 12 by passing the link through a central vertical recess in the valve plate, upsetting the end of the link 21 above the valve plate, or forming a ball thereon of sufficient size to prevent the same passing through the passageway in the plate. This connection between the brake shoe and the valve plate is sufficient, since the pressure of the fluid entering chamber 9 through pipe 11 tends to hold the valve in its open position at all times, it therefore being only necessary for the friction element 20 to draw the valve toward its seat in accordance with the variations of pressure between the friction elements 18 and 20.

The floating weight of the reproducer is indicated at 22, and from this depend lugs 23 in which is mounted the horizontal stud 24, which forms the axis on which stylus lever 25 bearing stylus 26 is pivotally mounted. Stylus lever 25 is connected as by link 27 with one end of the brake shoe 20. Link 27 passes through the vertical recess 28 in the floating weight. Brake shoe 20 is mounted on pin 29 and a flat spring 30 secured at 31 to some stationary part of the structure bears on a pin 32 situated on the shorter arm 33 of the brake shoe to maintain the shoe with a certain amount of pressure in contact with the rotating wheel 18.

Vertical movement given stylus 26 in tracking the record groove is transmitted with amplification by stylus lever 25 to the arm 33 of brake shoe 20, since the arm of lever 25 to the left of the pivot 24, as shown in the drawings, is longer than the arm of said lever to the right of the pivot. The amount of friction between the rotating member 18 and the shoe 20 is varied in accordance with the movement thus transferred to it from the stylus and the link 21 is caused to repeat the movements of the stylus in its rise and fall with amplification in a manner that is well known. Downward movements of link 21 so caused restrict the amount of opening of the ports covered by the valve 12, pressure of elastic fluid on the lower side of valve 12 always holding valve 12 in the position of greatest opening of the ports allowed by the link 21. The

column of air or other elastic fluid in resonating chamber 10 is thereby thrown into vibrations corresponding to those which originally caused the formation of the sound groove on the record tracked by stylus 26, these vibrations, however, being greatly amplified, and causing the reproduction of the record with great amplification.

It is, of course, obvious that various changes can be made in the construction of the apparatus shown without departing from the spirit of the invention. Thus, it is not essential that friction members of the type specified be used, nor is it essential that the design of the valve and ports indicated be followed. Instead of using air under pressure in the chamber 9, the use of a vacuum might be substituted and the relative proportions of the chambers 9 and 10 interchanged.

Having now described my invention, what I claim and desire to secure by Letters Patent of the United States is as follows:

1. In a phonograph, the combination with a stylus lever and reproducer stylus carried thereby, and means supporting said lever so that the stylus may track the record, of frictional means for amplifying the movement of said stylus, means for varying the flow of a fluid under pressure through an orifice, and means for transmitting the amplified movements caused by said frictional means to said varying means, substantially as described.

2. In a phonograph, the combination with a reproducer stylus mounted to track the record, of an air reproducer and frictional and lever connections between said stylus and the movable member of said air reproducer, for imparting to said movable member amplified movements corresponding to the movements of said stylus, and causing the air passing said movable member to be thrown into vibrations corresponding to the movements of said movable member, but still further amplified, substantially as described.

3. In a phonograph, the combination with a sound box having two chambers, a valve plate between said chambers and a valve co-acting therewith, of means for conducting a steady current of air or gas to one of said chambers, a rotating frictional member, a brake shoe co-acting therewith, connections from said shoe to said valve, a reproducer stylus, and connections from said stylus to said brake shoe, substantially as described.

4. In a phonograph, the combination with a sound box having chambers closed at one end, a valve seat and co-acting valve at the other end, means for conducting air or gas under pressure to said chamber, and a chamber on the other side of said valve connected to an outlet, of co-acting frictional members, a reproducer stylus, connections from

said stylus to one of said frictional members, and connections from said member to said valve to impart such movement of said member to said valve as causes said valve to move toward its seat, the pressure of air tending to move it from its seat, substantially as described.

5
10
15
5. In a phonograph, the combination with a sound box having chambers closed at one end, a valve seat and co-acting valve at the other end, means for conducting air or gas under pressure to said chamber, and a chamber on the other side of said valve connected to an outlet, of a rotating frictional member and a co-acting frictional member, an apertured floating weight, a stylus lever

mounted on said weight, a connection from said lever to said co-acting frictional member extending through said aperture, a one way connection from said co-acting member to said valve to move the latter in opposition to the air pressure, and additional means steadily but resiliently acting to hold the valve on its seat, substantially as described.

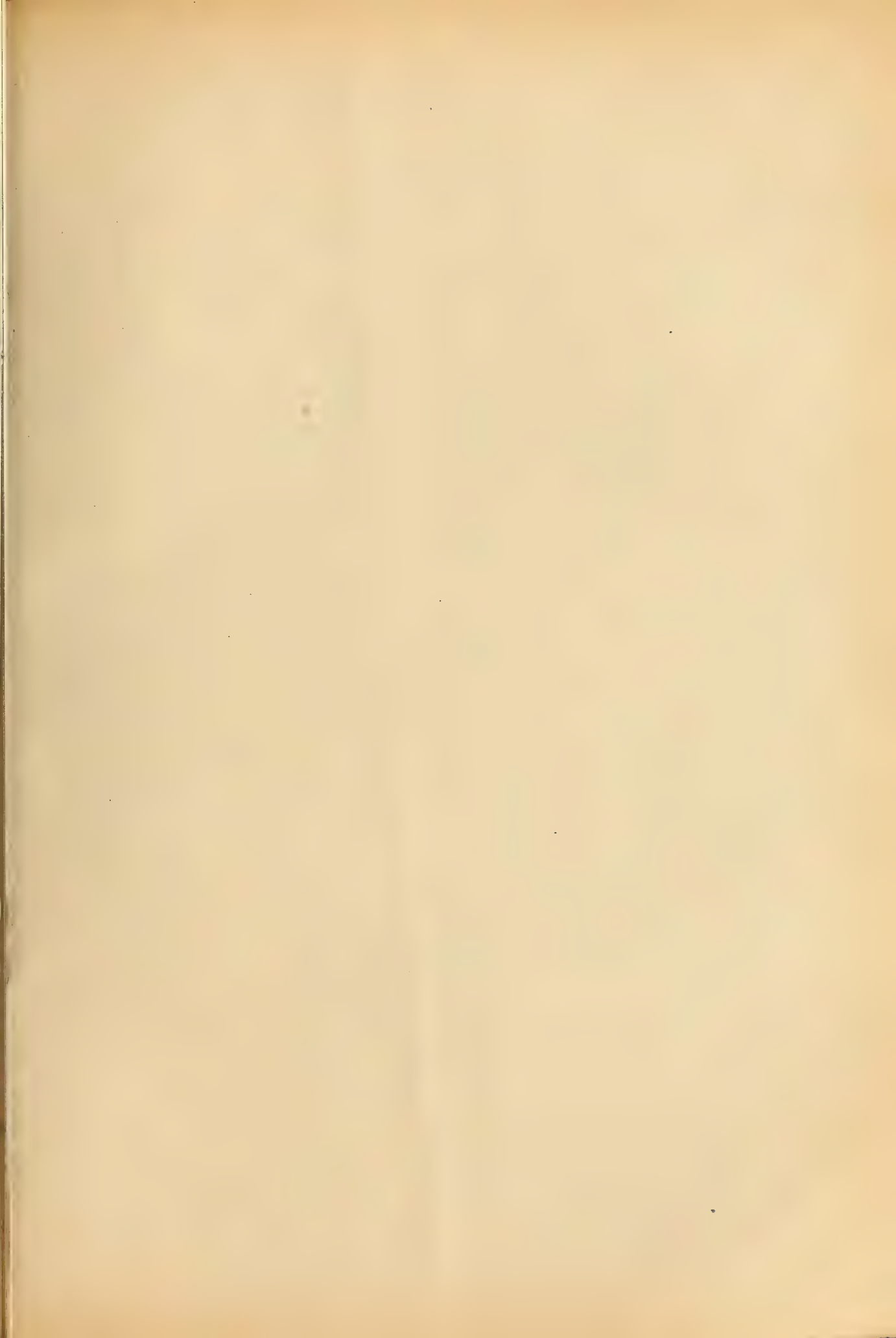
This specification signed and witnessed this 17 day of March 1909.

ALEXANDER N. PIERMAN.

Witnesses:

DYER SMITH,
FRANK D. LEWIS.





W. W. YOUNG.
SOUND REGULATOR.
APPLICATION FILED JAN. 9, 1907.

940,109.

Patented Nov. 16, 1909.

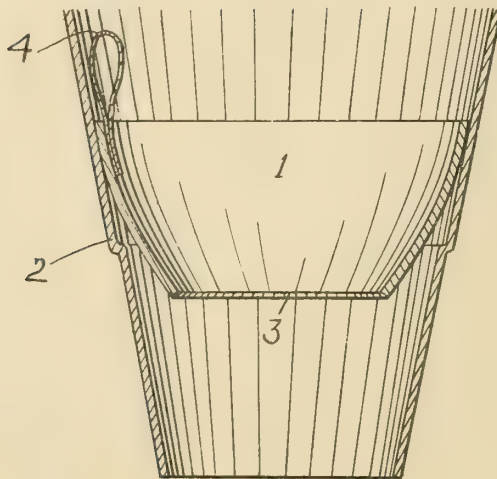


FIG. 1.

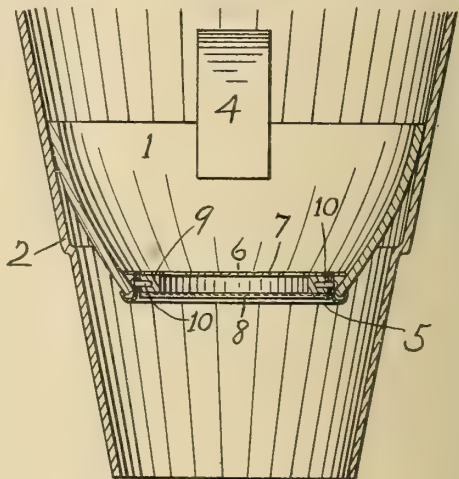


FIG. 2.

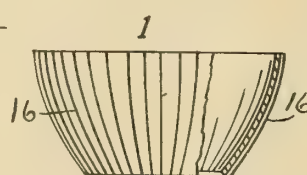


FIG. 6.

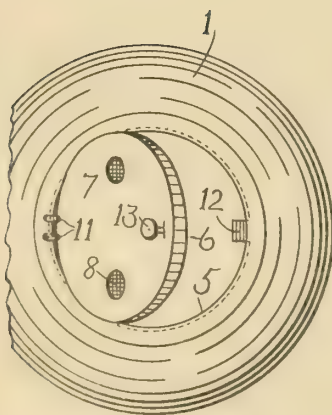


FIG. 4.

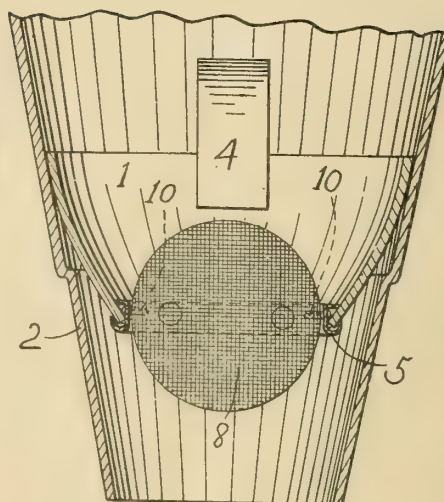


FIG. 3.

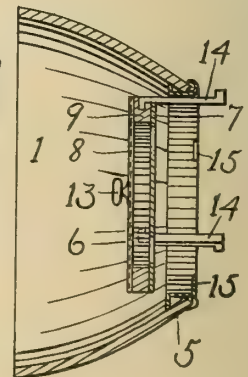


FIG. 5.

Witnesses
P. H. Martin
J. M. Sterns

Inventor
William W. Young,
by Webster & Co.
Attorneys

UNITED STATES PATENT OFFICE.

WILLIAM W. YOUNG, OF SPRINGFIELD, MASSACHUSETTS.

SOUND-REGULATOR.

940,109.

Specification of Letters Patent.

Patented Nov. 16, 1909.

Application filed January 9, 1907. Serial No. 351,419.

To all whom it may concern:

Be it known that I, WILLIAM W. YOUNG, a citizen of the United States of America, residing at Springfield, in the county of Hampden and State of Massachusetts, have invented a new and useful Sound-Regulator, of which the following is a specification.

My invention relates to improvements in devices designed to be placed in tubular parts, generally the horns, of sound-reproducing or talking-machines and in tubular parts of musical instruments such as cornets, trombones, and the like, for the purpose of changing the tone, and comprises a flaring holder as hereinafter claimed designed to fit in the tubular part best adapted to receive it, and a shutter arranged to open and close the mouth of said holder. The holder on account of its shape and other inherent characteristics is capable not alone of adapting itself to tubular parts of different sizes and styles, but of being employed without the shutter when it will give good results. The shutter can consist of any suitable material or any combination of such materials and is so fastened in the mouth of the holder as to be readily opened and closed.

The objects of my invention are, first, to produce a device, especially intended for use in horns of talking-machines and in the capacity of mutes in wind instruments, whereby the sound waves are more or less modified in their passage through a tubular member containing said device so that a softened and mellowed tone is given off; second, to provide a device of this kind which is applicable to a great variety of different tubular parts or horns; third, to afford means in such a device for changing the relation of the parts for the purpose of varying the volume and quality of sound emitted, and, fourth, to embody my invention in a simple and inexpensive device which is entirely practicable and efficient and which has all of the advantages noted above. I attain these objects by the means illustrated in the accompanying drawings, in which—

Figure 1 is a sectional view of the neck of a horn and of one form of my improved holder in such neck; Fig. 2, a similar view showing also one form of shutter, the same being in its closed position; Fig. 3, a view like the preceding one except that the shutter is shown open; Fig. 4, an outside view of a holder and shutter showing the diaphragmal or movable shutter member hinged

to the supporting ring or collar instead of being pivotally mounted therein as in Figs. 2 and 3; Fig. 5, a sectional view of a holder and shutter showing the movable shutter member slidably-mounted relative to the collar, and, Fig. 6, a side elevation on a reduced scale and partly in section of a slightly modified form of holder.

Similar figures refer to similar parts throughout the several views.

The holder which constitutes an important and essential element of my invention, since it possesses inherent properties which render it alone adequate for modifying tone to a considerable degree hence can be used independently, consists of a bell-shaped piece 1, preferably of rubber or other suitable yielding or flexible material, although said piece may be made of metal or other comparatively unyielding material in which case it should generally have a rubber, felt, or other yielding cover, or in place of a cover one or more external rings or bands, to assist in holding the device in the tubular part. This bell-shaped piece or holder is open at both ends. The exterior outline of the holder longitudinally may be plain or curved either inward or outward—the outwardly curved or convex configuration shown having been found to be very satisfactory. A holder of this description owing to its shape can be fitted into a tubular part of almost any instrument or machine for producing or reproducing sound, as into the neck portion 2 of a talking-machine horn, with the small end or mouth 3 of said holder adjacent to the small end of said neck portion of the horn. Although as before stated the holder may be made, if of the proper shape, out of material which is not flexible, a flexible holder is generally to be preferred owing to its adaptability as a modifier of sound and for the reason that it is so well qualified for proper adjustment in the horn. The holder 1 is provided with a suitable tab 4 to facilitate the introduction of the holder into a horn and removal of the same therefrom. The holder is inserted in the neck 2 through the large end of the horn and the flaring sides of said holder find lodgment against the tapering sides of said neck to which they readily adjust themselves.

The holder 1 constricts the passage in the neck 2 in consequence of which the sound waves from the machine impinge thereon and are thereby rendered sweet and mellow.

To enhance the mellowing effect of the device a flanged ring or collar 5 is inserted in the mouth 3 of the holder 1, the lips of such mouth encircling said ring between the flanges of the same, and a diaphragmal member or shutter proper 6 is connected with the ring to normally fill the space therein. This shutter may be variously constructed, the one shown in the drawings consisting of a perforated leather disk 7, a wire gauze disk 8 and an interposed fibrous ring 9, all fastened together in any suitable manner. As already intimated, however, the shutter may be made up in numerous ways and of various materials.

The holder 1 affords a convenient medium for the ready insertion and withdrawal of the diaphragmal member, even though such member were not in the form of a shutter, nevertheless, I prefer to employ the shutter construction as I am thus able to secure any desired amount of adjustment which may be required to accommodate the device to the different volumes of sound which the machine or instrument will produce, and to this end I so connect the shutter with the holder or with the aforesaid collar as to permit said shutter to be closed and opened. Furthermore, the provision for opening and closing is such that the shutter can be either opened wide or only partially, can, in short, be opened to whatever extent may be desired or required. A number of different ways for movably mounting the shutter 6 relative to the collar 5 may be devised, but either of the three methods illustrated is practicable. These several illustrated mountings will now be explained.

Taking the first, that shown in Figs. 2 and 3, it will be seen that two pins 10 are inserted in opposite sides of the ring member 9 of the shutter 6 after passing through adjacent points in the collar 5. The edges of the mouth 3 of the holder 1 keep the pins 10 in place. The shutter is thus hung so that it can rotate on a diametral axis and is closed when it lies within the collar and open when turned since then the portions of the edges intermediate of the pivotal points emerge from said collar on both sides. When the shutter is turned so that the planes of the collar and shutter are at right-angles the latter is wide open, as shown in Fig. 3, and said shutter can be opened to any less degree, of course, by not turning it so far. The influence which the shutter exercises over the sound emanating from the machine or instrument with which the device is associated is greatest when the shutter is closed, becomes less when the shutter is opened, the amount of such influence then depending upon the extent of the opening, and practically ceases when the shutter is wide open; this is also true of the other forms of construction.

In Fig. 4, the shutter 6 is hinged at 11 to the collar 5 and swings outward to open the same. Said shutter is shown partly open in this view. A lug 12, formed by cutting and bending inward a part of the collar, is provided to receive the side of the shutter which is opposite the hinge 11 when the shutter is swung inward and thus insure the proper closing thereof. A knob 13 is placed on the outer face of the shutter to be grasped for the purpose of operating the latter.

The construction shown in Fig. 5 is such that the shutter is moved bodily in and out of the collar on the same axis with that of the collar to effect the closing and opening. In this case the shutter 6 is provided with a plurality of guide-rods 14 adapted to center said shutter relative to the center of the collar 5 and to play back and forth in and through said collar. The guide-rods 14 extend from the periphery of the shutter, parallel with the axis thereof, into and through the collar, having their outer ends bent so as to engage the adjacent edge of said collar when said shutter is drawn out of and away from the collar into its extreme open position and thus limit such movement. When the shutter is closed it comes to rest against one or more lugs 15, similar to the lug 12, formed on the inside of the collar. The shutter in this instance is provided with a knob 13 as in the preceding case and for the same purpose. The shutter in Fig. 5 is only part way open hence will have some influence on the passing sound, more than if it were drawn as far away as possible from its collar—then it would have little or no influence.

It is obvious that the collar and shutter shown in Fig. 4 can be oppositely disposed relative to the holder so that the shutter will open inward, that is, into the holder, instead of outward as it does now; furthermore, a similar rearrangement or readjustment of the parts shown in Fig. 5 can be made so as to have the shutter there open outward, that is, away from or beyond the holder, instead of inward or into the interior of said holder. With the knob 13 on the outside of the shutter in the Fig. 4 arrangement it is necessary to remove the device from the horn in order to close it, unless a knob be placed on the inside of the shutter, and a rearrangement of the parts in the Fig. 5 device also calls for a knob on the opposite face of the shutter.

It is to be understood that the modified forms of my device which include the shutter are to be applied to a horn in the same way in which the device shown in Figs. 2 and 3 is applied. To change the volume of sound or the tone, when one of these devices is in use, either reach into the horn and rearrange the shutter as required, or take out the whole device, rearrange the shutter and

then return the device to its former position in the horn.

The holder 1 shown in Fig. 6 has external corrugations 16 which with the sides of an inclosing horn provide passages for the escape of sound and obviate any unsatisfactory muffled effect that might be otherwise produced by the shutter when closed, it being understood that the corrugated holder may have a diaphragm like the non-corrugated holder. The corrugated holder can be used without a diaphragm as well as the other holder and when so used produces much the same effect as the other.

All changes and modifications which may justly be said to fall within the scope of my invention I desire and intend to include in and cover by my claims.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination, with a tube of a sound producing or reproducing instrument or machine, of a removable sound regulator consisting of a flaring cup-shaped member open throughout and bearing at its larger end directly against the sides of said tube and otherwise curved inwardly and out of touch with such sides, the sides of said member being imperforate.

2. As a new article of manufacture, a regulator, of the class described, consisting of an externally-corrugated bell-shaped member open at both ends adapted to be inserted in and removed from a tubular part of a sound-producing or -reproducing instrument or machine, such member having an unobstructed passage therethrough and arranged at one terminal to bear directly against the sides of said tubular part.

3. As a new article of manufacture, a regulator, of the class described, consisting of a soft flexible or yielding bell-shaped member open at both ends adapted to be inserted in and removed from a tubular part of a sound-producing or -reproducing instrument or machine, such member having an unobstructed passage therethrough and arranged at one terminal to bear directly against the sides of said tubular part.

4. As a new article of manufacture, a reg-

ulator, of the class described, consisting of a bell-shaped member open at both ends adapted to be inserted in and removed from a tubular part of a sound-producing or -reproducing instrument or machine, such member having an unobstructed passage therethrough and arranged at one terminal to bear directly against the sides of said tubular part, and a diaphragmal member in the mouth or most constricted part of said bell-shaped member.

5. As a new article of manufacture, a regulator, of the class described, consisting of a bell-shaped member open at both ends adapted to be inserted in a tubular part of a sound-producing or -reproducing instrument or machine, of a diaphragmal member in the mouth of said bell-shaped member adapted to open and close such mouth.

6. The combination, in a regulator, of the class described, with a bell-shaped holder open at both ends adapted to be inserted in a tubular part of a sound-producing or -reproducing instrument or machine, and a ring or collar in the mouth of said holder, of a shutter connected with said collar and adapted to open and close the passage therethrough.

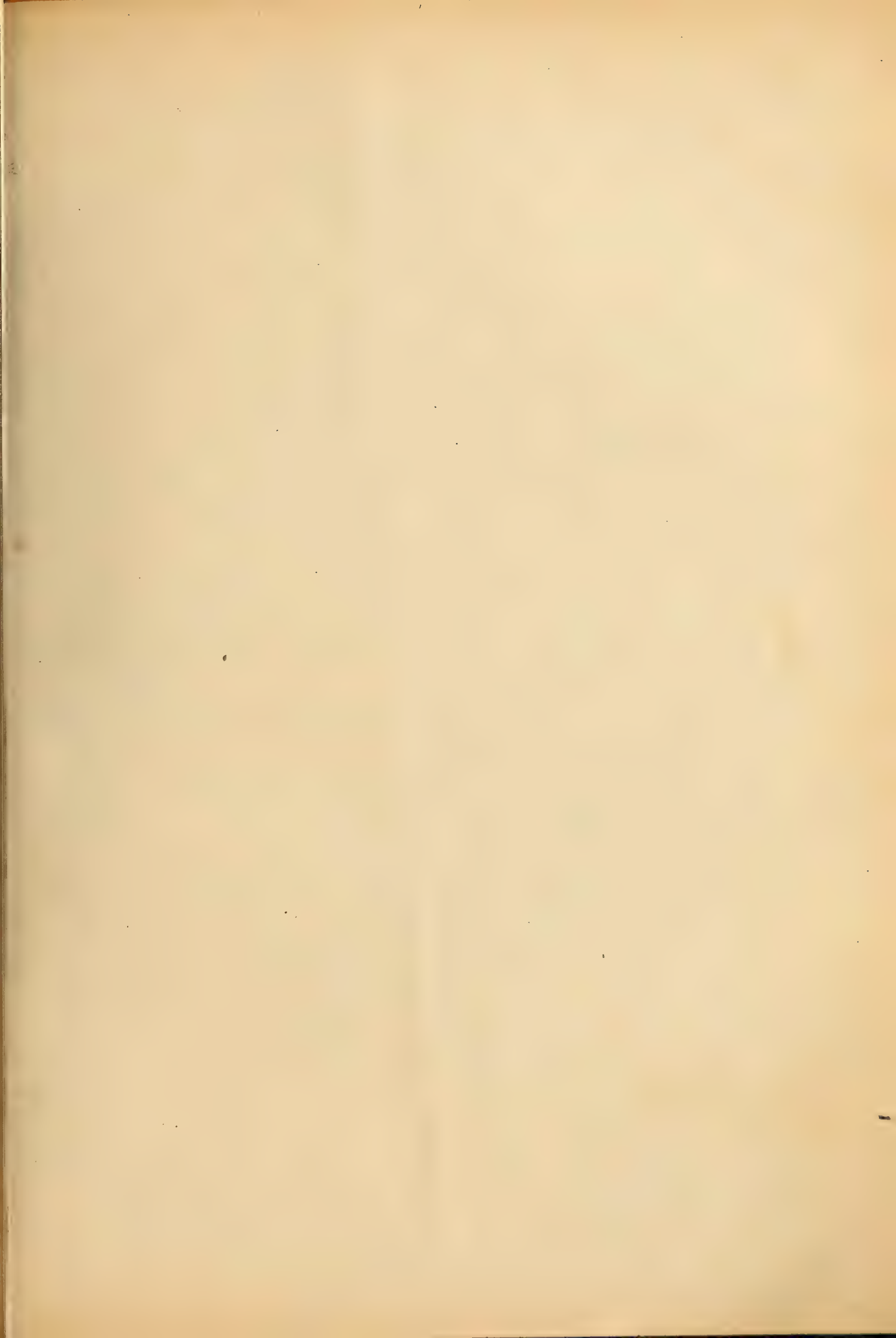
7. The combination, in a regulator, of the class described, with a bell-shaped holder open at both ends adapted to be inserted in a tubular part of a sound-producing or -reproducing instrument or machine, and a ring or collar in the mouth of said holder, of a shutter pivotally mounted in said ring or collar and adapted to open and close the passage therethrough.

8. The combination, in a regulator, of the class described, with a collar, and a shutter connected with said collar and adapted to open and close the passage in such collar, of means to support the collar with its shutter in a tubular part of a sound-producing or -reproducing instrument or machine, such means being independent of and separable from such tubular part.

WILLIAM W. YOUNG.

Witnesses:

P. H. MARTIN,
F. A. CUTTER.



M. KEEN.
SOUND BOX FOR TALKING MACHINES.
APPLICATION FILED JULY 9, 1909.

940,161.

Patented Nov. 16, 1909.

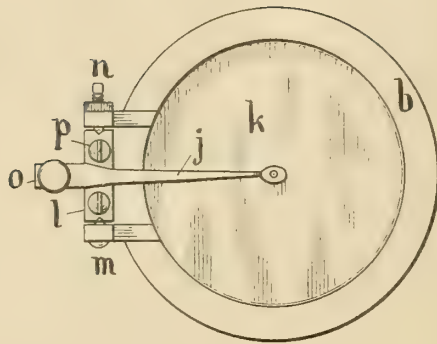


Fig. 1

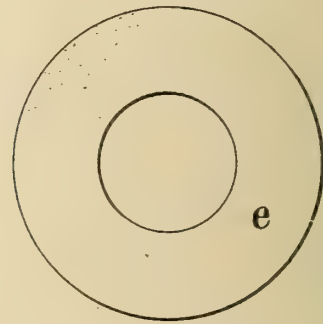


Fig. 5

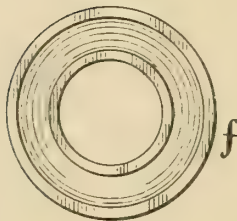


Fig. 4

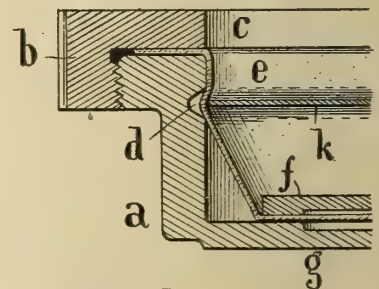


Fig. 3

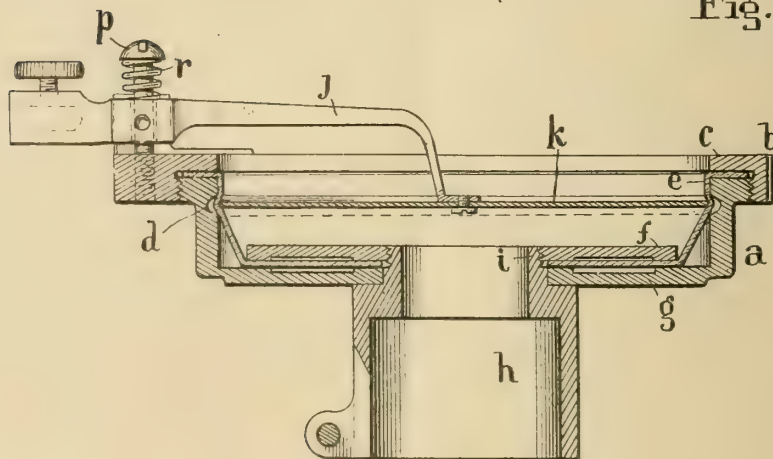


Fig. 2

WITNESSES

A. M. Kelly.
E. G. Farley.

INVENTOR

Morris Keen
BY *A. M. Kelly*
ATTORNEY

UNITED STATES PATENT OFFICE.

MORRIS KEEN, OF PHILADELPHIA, PENNSYLVANIA.

SOUND-BOX FOR TALKING-MACHINES.

940,161.

Specification of Letters Patent.

Patented Nov. 16, 1909.

Application filed July 9, 1909. Serial No. 506,664.

To all whom it may concern:

Be it known that I, MORRIS KEEN, a citizen of the United States, and a resident of the city and county of Philadelphia and State of Pennsylvania, have invented an Improvement in Sound-Boxes for Talking-Machines, of which the following is a specification.

My invention has reference to sound boxes for talking machines and consists of certain improvements which are fully set forth in the following specification and shown in the accompanying drawings which form a part thereof.

The object of my invention is to provide a construction of sound box in which the diaphragm is yieldingly supported in the box so that it has capacity for vibration adjacent to its perimeter as well as at its center and to otherwise construct the sound box as a whole that it will be inexpensive to construct, sensitive in action and easily and quickly repaired.

My invention consists of certain features of construction which are fully described hereinafter and more particularly defined in the claims.

The invention will be better understood by reference to the drawings, in which:

Figure 1 is an elevation of a sound box embodying my invention; Fig. 2 is a cross sectional view of the same; Fig. 3 is an enlarged cross section of a portion of the same; Fig. 4 is a plan view of the clamping annular plate; and Fig. 5 is a plan view of the yielding lining before being applied to the box.

a is the body of the box and is made circular with an annular back g . The open end of this box a is screw-threaded upon the outside and upon which is screwed a cap b , the inner annular flange c of which coöperates with the annular rim of the box to clamp a yielding lining e . The yielding lining e may be of rubber, felt or other textile or elastic material and having an annular shape indicated in Fig. 5 before being applied within the box. When applied in position within the box, the outer perimeter of this lining is first clamped between the flange c and the rim of the body a . A washer or annular ring f is then placed over the middle part of the lining and pressed downward into the box with its central aperture in line with the aperture in the middle of the back g of the box. A rear tubular

part h having the screw-threaded shank i is then placed in position at the back of the box with the tubular screw-threaded end i extending through the aperture thereof and screwed into the aperture in the washer or annular ring f . By turning the tubular part h upon the sound box body the clamping washer or ring f is drawn toward the back g until it tightly clamps the yielding lining e , as indicated in Figs. 2 and 3. The lining will then be stretched from the clamping cap b down to the clamping washer or ring f and forms a conical lining to the body. A diaphragm k of metal or other suitable material, having a diameter slightly less than the inner diameter of the body a , is pressed downward into the yielding lining e and is held in position parallel to the back of the box and the washer or clamping ring f thereof.

To give to the diaphragm a desirable yielding support about its perimeter, I provide a deep and wide annular groove d on the inner face of the body a and immediately in line with the diaphragm so that the yielding lining is stretched over the edge of the diaphragm and is supported by the body a on each side of the annular groove d . As the yielding lining is free to move in all directions adjacent to the perimeter of the diaphragm it will be understood that in vibrating the diaphragm, not only will the center be vibrated, but the perimeter of the diaphragm will also have more or less free vibration in a direction at a right angle to the plane of the diaphragm. The diaphragm is, in effect, a floating diaphragm free to be moved bodily by the stylus bar. The yielding lining e is supported tightly against the inner face of the body between the annular groove d and the flange c of the clamping cap b and from the groove downward it is preferably clear of the inner wall of the body. By examining Fig. 3, it will be seen that the diaphragm is normally held in a yielding manner by the flexible lining and while no great strain is put upon the diaphragm to interfere with its movement in any direction, there is no possibility of escape of air around the perimeter of the diaphragm.

j is a stylus bar and has one end secured to the center of the diaphragm k and the other end provided with a clamp o for receiving and holding the stylus or needle point. The stylus bar j is pivoted to the cap

b at *m* and *n* so that it is free to oscillate upon an axis arranged parallel to the plane of the diaphragm. To provide room for the adjustment springs, I prefer to form the stylus bar cross shaped, as indicated in Fig. 1. The cross piece *l* of the stylus bar is provided with large holes through which the adjusting screws *p* extend and said screws are screwed into the cap *b*, as clearly indicated in Figs. 1 and 2. Between the heads of the screw and the cross piece *l* of the stylus bar, I provide coil springs *r* which press upon the stylus bar structure to hold it in a normally intermediate position and with provisions for adjustment to make it more or less sensitive to being oscillated and by which to regulate the degree of vibration permitted to the diaphragm.

Other ways of supporting the stylus bar may be employed in place of that shown, as my improved manner of holding the diaphragm may be employed with any mechanism for supporting the stylus bar which will permit freedom of vibration of the diaphragm.

While I prefer in practice, to employ rubber for the lining *c*, as I have found this best suited for the purpose; I may nevertheless employ felt, flannel or other textile material having yielding properties, if so desired.

Other means of holding the clamping washer *f* may be employed in lieu of those shown; and in general, while I prefer the construction illustrated, I do not restrict myself to the minor details thereof, as these may be modified without departing from the spirit of the invention.

Having now described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. In a sound box, a body part having a circular interior provided with an annularly grooved wall, combined with a yielding lining secured to the body at its front part and extending inwardly over the annular groove and secured adjacent to the back of the body, a diaphragm yieldingly supported by the yielding lining adjacent to and in the plane of the annular groove, and a stylus bar having a connection with the diaphragm.

2. In a sound box, a body part having a circular interior provided with an annularly grooved wall, combined with a yielding lining secured to the body at its front part and extending inwardly over the annular groove and secured adjacent to the back of the body by a clamping ring within the body for clamping the middle part of the yielding lining adjacent to the back of the body, means to hold the clamping ring in position upon the back, a diaphragm yieldingly supported by the yielding lining adjacent to and in the plane of the annular groove, and a stylus bar having a connection with the diaphragm.

3. In a sound box, a body part having a circular interior provided with an annularly grooved wall, combined with a yielding lining secured to the body at its front part and extending inwardly over the annular groove and secured adjacent to the back of the body by a clamping ring within the body for clamping the middle part of the yielding lining adjacent to the back of the body, means to hold the clamping ring in position upon the back consisting of a tubular part resting against the back and having a screw-threaded end extending through the back and engaging the clamping ring, a diaphragm yieldingly supported by the yielding lining adjacent to and in the plane of the annular groove, and a stylus bar having a connection with the diaphragm.

4. In a sound box, a body part having a circular interior provided with an annularly grooved wall, combined with a yielding lining secured to the body at its front part and extending inwardly over the annular groove and secured adjacent to the back of the body, a diaphragm yieldingly supported by the yielding lining adjacent to and in the plane of the annular groove, a stylus bar having a connection with the diaphragm, and means for yieldingly supporting the stylus bar normally in an intermediate position for holding the diaphragm in line with the annular groove in the body.

5. In a sound box, the combination of a circular body having its inner wall provided with a deep annular groove, a clamping cap adapted to the outer rim of the body, an annular lining of yielding material clamped between the rim of the body and the cap, means within the body for clamping the inner part of the yielding lining at a point within the body, a diaphragm within the body and engaging the yielding lining in the plane of the deep annular groove, and a stylus bar connected with the diaphragm.

6. In a sound box, the combination of a circular body having its inner wall provided with a deep annular groove, a clamping cap adapted to the outer rim of the body, an annular lining of yielding material clamped between the rim of the body and the cap, means within the body for clamping the inner part of the yielding lining at a point within the body consisting of an annular clamping plate, a screw-threaded tubular part extending through the back of the body and engaging the annular clamping plate, a diaphragm within the body and engaging the yielding lining in the plane of the deep annular groove, and a stylus bar connected with the diaphragm.

7. In a sound box, the combination of a metallic box having a circular interior, a lining of yielding material forming a circular yielding wall within the box unsupported in a plane between its outer and inner edges,

a diaphragm having its perimeter pressed into contact with the yielding lining at a place corresponding to the plane thereof which is unsupported whereby the diaphragm is yieldingly supported by the lining, and a stylus bar having a connection with the body for vibrating the diaphragm.

In testimony of which invention, I hereunto set my hand.

MORRIS KEEN.

Witnesses:

R. M. HUNTER.

R. M. KELLY.



A. J. SMITH.
 PHONOGRAPHIC NEEDLE.
 APPLICATION FILED MAR. 13, 1909.

940,486.

Patented Nov. 16, 1909.

Fig. 1.

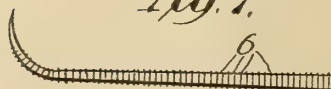


Fig. 2.

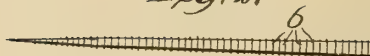


Fig. 3.

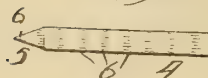
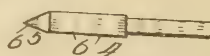


Fig. 4.



Witnesses

Wm. P. Bond

Ernest W. Banning.

Inventor:
Andrew J. Smith.

by *Allys*
Allys

UNITED STATES PATENT OFFICE.

ANDREW J. SMITH, OF CHICAGO, ILLINOIS, ASSIGNOR OF ONE-HALF TO FREDERICK R. BAKER, OF CHICAGO, ILLINOIS.

PHONOGRAPHIC NEEDLE.

940,486.

Specification of Letters Patent.

Patented Nov. 16, 1909.

Application filed March 13, 1909. Serial No. 483,178.

To all whom it may concern:

Be it known that I, ANDREW J. SMITH, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Phonograph - Needles, of which the following is a specification.

In the making of phonograph needles, it is highly desirable that the substance from which the needle is formed should be of sufficient strength and toughness to maintain a fine point adapted to register the most minute variations in the record line, and at the same time have a certain smoothness and pliability which will prevent the needle from scratching the record.

The needle of the present invention possesses qualities which render it highly satisfactory for phonographic purposes. It is of such tough fiber and consistency as to maintain a point for a relatively long period and at the same time will not scratch or wear away the finer variations in a record line, nor will the point burn off when subjected to the heat of friction. Moreover, the present needle secures a tone which is ample in volume and of the finest quality, being free from all scratching or metallic noises and reproducing the finest variations of tone and quality in the record.

In the drawings illustrating the invention, Figures 1 and 2 are views showing cactus spines from which the needles are made; and Figs. 3 and 4, views showing the completed needles.

The needle is made from the spines of a cactus found more particularly in arid portions of New Mexico and Arizona, the spines of which are distinguished by the presence of bands or rings which extend through the body of the spine, which latter when scraped is ordinarily in part of a reddish or rose color and in part of a whitish translucent color. The spine, in its natural state, as shown in Figs. 1 and 2, varies in shape, in some cases being bent or hooked like a claw, as shown in Fig. 2, and in other cases being straight, as shown in Fig. 1.

The spines of the genus *Echinocactus* possess the characteristics above referred to and are particularly adapted for the purpose of making phonographic needles, although some other varieties of the cactus plant possess similar qualities in a greater or less degree. The extremely dry conditions under which such cacti grow, together with the slowness of development, seem to account, in part, for the toughness and hardness of the spines which possess these characteristics in a marked degree as compared with the thorns of most plants or trees which grow under ordinary conditions of climate and rainfall.

In making phonographic needles from the spines, the upper surface or layer of the spine, which is of a roughened or corrugated nature, is cut or scraped away, and the spine is cut down to the requisite size to provide a straight or shouldered shank portion 4 and a blunt point 5, the tip of which terminates in one of the rings 6 which appear to be of a somewhat harder consistency than the intermediate portions of the spine.

In using phonographic needles made from the spines of the cactus, the needles, instead of wearing away or deteriorating, appear to improve with moderate usage and may be used repeatedly without injury either to the needle or the record. The cactus spines are of a carboniferous nature and of exceedingly fine and even grain, so that they can be sharpened to the finest point and resharpened from time to time as occasion may require.

What I regard as new and desire to secure by Letters Patent is:

A phonograph needle made from the spine of a cactus plant, said spine having rings or bands of greater hardness than the intermediate sections of the spine, and having its point formed to terminate in one of said rings or bands.

ANDREW J. SMITH.

Witnesses:

WALKER BANNING,

PETERSON W. BANNING.



J. W. AYLSWORTH.
 APPARATUS FOR MAKING DUPLICATE PHONOGRAPH RECORDS.
 APPLICATION FILED MAR. 12, 1907.

940,631.

Patented Nov. 16, 1909.

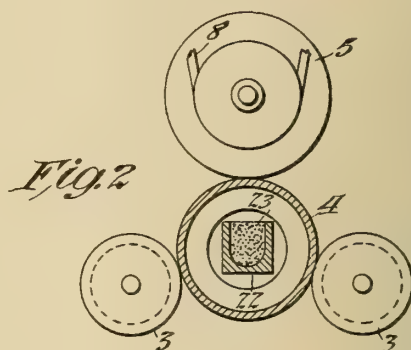
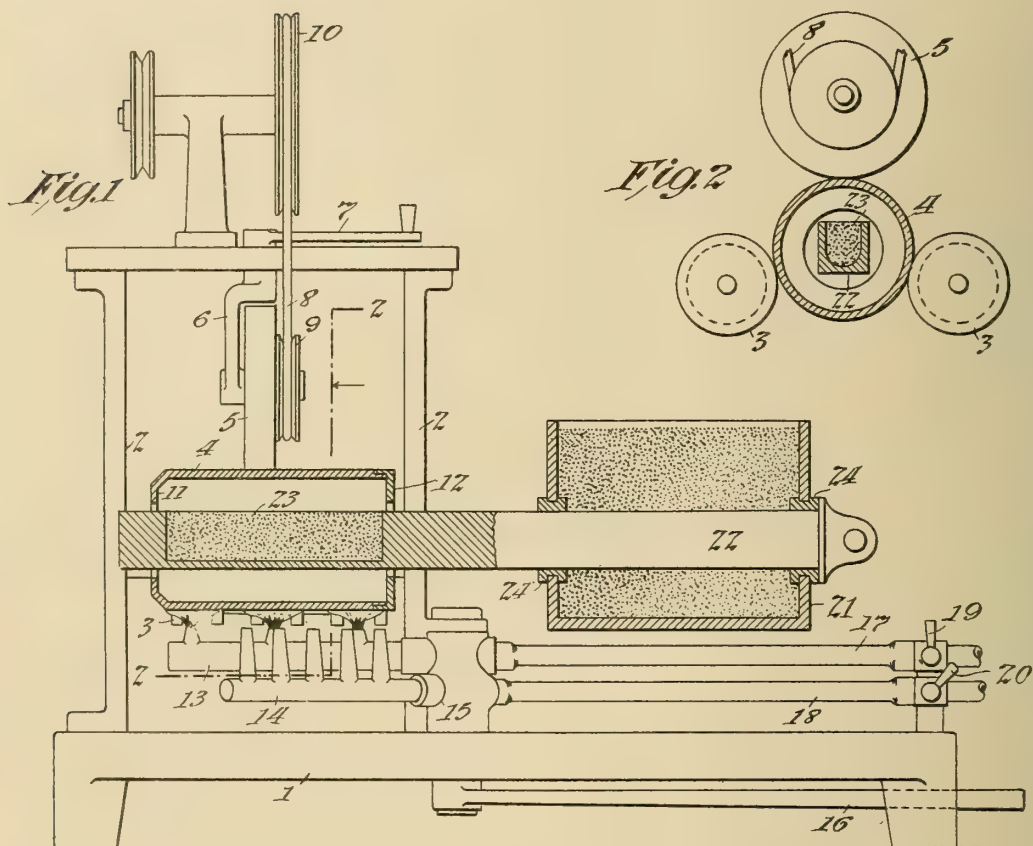


Fig. 3

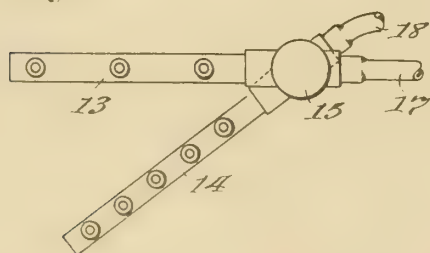
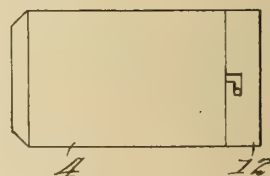


Fig. 4



Witnesses:

Frank D. Lewis
 Edw. Holden

Inventor:

Jonas W. Aylsworth
 by Frank L. Spier
 Atty.

UNITED STATES PATENT OFFICE.

JONAS W. AYLSWORTH, OF EAST ORANGE, NEW JERSEY, ASSIGNOR TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

APPARATUS FOR MAKING DUPLICATE PHONOGRAPH-RECORDS.

940,631.

Specification of Letters Patent.

Patented Nov. 16, 1909.

Original application filed May 16, 1906, Serial No. 317,082. Divided and this application filed March 12, 1907. Serial No. 361,958.

To all whom it may concern:

Be it known that I, JONAS W. AYLSWORTH, a citizen of the United States, residing at 223 Midland avenue, East Orange, county of Essex, and State of New Jersey, have invented a certain new and useful Improvement in Apparatus for Making Duplicate Phonograph-Records, of which the following is a description.

This application is a division of Patent No. 855,553, granted June 4, 1907.

In Letters Patent No. 855,603, granted June 4, 1907, I describe an improved process and apparatus for making duplicate phonograph records, in which a heated mold is rapidly rotated and a charge of molten material is supplied to the mold, so as to be distributed uniformly over the bore thereof while in a fluid condition, thereby driving any air or gas bubbles inwardly, after which the mold is rapidly cooled while being still rotated so as to cause the material to set and harden.

My present invention relates to an improved apparatus of the general type disclosed in said application, but wherein provision is made whereby the material of which the record is to be made may be introduced within the mold in a solid condition, preferably in the form of a powder or small granules. Such a mode of operation is especially advantageous in connection with the molding of materials having a high melting point, or which are stringy or extremely viscous when molten so as to be difficult of manipulation in that condition, such as asphalt, shellac compositions, copal gum or compounds employing these ingredients. Even for the molding of records from ordinary wax-like compositions of the type disclosed in my Patent No. 782,375, dated February 14, 1905, it may in some instances be desirable to effect the molding from the solid state, as I shall hereafter describe, owing to the ease with which a definite quantity of such materials can be measured and the inconvenience of working with the material in a molten state.

In carrying the present invention into effect, I provide means for rotating a hot mold at high speed and for introducing a fusible material therein in the solid state, preferably in the form of powder or small

granules, whereby the fusible material will be uniformly distributed over the bore of the mold by the centrifugal force developed and will be melted by the heat of the mold, so as to become fluid and take a very perfect impression from the record surface, at the same time displacing any air or gas bubbles and forcing the same inwardly; after which the mold will be cooled, so as to chill or set the material while the mold is being continuously rotated.

In order that the invention may be better understood, attention is directed to the accompanying drawing, forming part of this specification, and in which—

Figure 1 is a longitudinal sectional view of an apparatus constructed in accordance with my invention; Fig. 2, a sectional view on the line 2-2 of Fig. 1; Fig. 3, a plan view, showing the heating and cooling mechanism, and Fig. 4, an elevation of the complete mold.

In all of these views corresponding parts are represented by the same numerals of reference.

The base 1 is provided with frames 2-2, in which are mounted the idler rollers 3-3, for supporting the mold 4.

5 is a driving roller for rotating the mold, said roller being carried in a swiveled bracket 6, operated by a handle 7, so that by skewing the roller 5 the mold will be moved longitudinally from its engagement with the idler rollers 3-3, as I describe in said Patent No. 855,553. The driving roller 5 is rotated by a belt 8, engaging a pulley 9 and driven from a pulley 10.

The mold 4 is of any suitable type, carrying as heretofore the representation in relief of a record on its bore, and is provided with the usual flange 11, and with a removable flange 12, the latter being held in place by a bayonet joint, as shown in Fig. 1. I illustrate a gas burner 13, for heating the mold, and water nozzles 14 for cooling the same. The gas burner and water nozzles are connected to a pivoted body 15, operated by a handle 16, so that either the burner or nozzles may be brought in position below the mold to heat or cool the same. Flexible pipes 17-18 with valves 19-20 convey gas or water to the burner 13 or nozzles 14 respectively.

It will be understood that other devices may be employed for heating and cooling the mold and that the mold may be heated to the necessary temperature outside of the apparatus when possessed of sufficient body to effect the melting of the solid material introduced therein.

Preferably the material from which the records are made is contained in powdered form in a receptacle 21, adjacent to the mold, and in this receptacle is mounted a shaft 22, preferably square in cross-section, and having a trough 23 formed therein and arranged to reciprocate with respect to the receptacle. This shaft is mounted in independently rotatable bushings 24, which permit the shaft to be turned with respect to the receptacle when it is desired to empty the charge of material into the mold. It will be obvious that by moving the shaft 22 to the right (Fig. 1) so as to withdraw the trough 23 within the receptacle 21, the trough will be filled with the powdered or granular material, so that when the shaft is returned to the position shown in Fig. 1, a fixed and definite charge of the material will be introduced within the mold. By now giving the shaft a half rotation, the charge of material will be deposited within the rapidly turning mold, so as to be uniformly distributed over the bore of the same. By reason of the heated condition of the mold, the material will be quickly brought to a fluid state, in which condition it intimately engages the entire record surface, forcing any air or gas bubbles radially inward and taking a very perfect impression. During this operation, the gas burner 13, if used, is maintained beneath the mold, so as to keep the latter in a heated condition. After the impression has been taken and while the mold is still being rapidly rotated, the handle 16 is operated so as to swing the water nozzles 14 beneath the mold, and the valve 20 is operated so as to cause jets of water to impinge against the mold and rapidly cool the same with its charge of material. When the material has been thus set and hardened, the handle 7 is moved to skew the driving roller 5, and force the mold longitudinally from its engagement with the idler rollers, whereupon the operations described are repeated.

A suitable material for use in the operation of the apparatus described is that disclosed in my said Patent No. 782,375, dated February 14, 1905, which material will be crushed or ground to a powdered or granular condition, after having been formed. Any other fusible material may, however, be employed, such for example, as asphalt, rubber compositions, and compounds of a similar nature.

It is possible by the method disclosed to make very perfect duplicate records of ma-

terials that are so stringy and viscid when in a molten condition that they cannot be effectively molded by existing processes, or whose melting point is so high as to make such processes undesirable.

Having now described my invention, what I claim as new and desire to secure by Letters Patent is as follows:

1. Apparatus for making duplicate phonograph records, comprising in combination a hot tubular mold, means for rapidly rotating the same, means for introducing within the mold a charge of solid fusible material of definite quantity, and means for maintaining the heat of the mold until the record is formed, substantially as set forth.

2. Apparatus for making duplicate phonograph records, comprising in combination a hot tubular mold, means for rapidly rotating the same, means for introducing within the mold a measured charge of solid fusible material, and means for rapidly cooling the mold, substantially as set forth.

3. Apparatus for making duplicate phonograph records, comprising in combination a horizontal tubular mold, means for rapidly rotating the same, means for heating the mold, and horizontally movable means for introducing within the mold a charge of solid fusible material, substantially as set forth.

4. Apparatus for making duplicate phonograph records, comprising in combination a tubular mold, means for supporting and rapidly rotating the same, a gas burner for heating the mold, a water nozzle for cooling the mold, means for alternately coöperating the burner and nozzle with the mold, and means for introducing within the mold a charge of solid fusible material, substantially as set forth.

5. Apparatus for making duplicate phonograph records, comprising in combination a hot tubular mold, means for supporting and rapidly rotating the same, a receptacle adjacent to the mold containing unfused fusible material, and means for transferring a measured charge of such material from said receptacle and depositing the same in the mold, substantially as set forth.

6. Apparatus for making duplicate phonograph records, comprising in combination a tubular mold, means for supporting and rapidly rotating said mold, a receptacle adjacent to the mold, containing powdered fusible material, and a trough movable between said receptacle and mold for conveying a charge of material from the receptacle to the mold, substantially as set forth.

7. Apparatus for making duplicate phonograph records, comprising in combination a tubular mold, means for supporting and rapidly rotating said mold, means for heating the mold, a receptacle adjacent to the mold for containing unfused fusible ma-

terial, and a trough movable between said receptacle and mold for conveying a charge of material from the receptacle to the mold, substantially as set forth.

5 8. Apparatus for making duplicate phonograph records, comprising in combination a tubular mold, means for supporting and rapidly rotating the same, a receptacle adjacent to the mold, containing powdered
10 fusible material, a reciprocable and rotatable shaft mounted in said receptacle, and a trough formed on said shaft, whereby a charge of material from the receptacle may
15 therein, substantially as set forth.

9. Apparatus for making duplicate phonograph records, comprising in combination a

tubular mold, means for supporting and rapidly rotating said mold, means for heating the mold, a receptacle adjacent to the mold for containing unfused fusible material, a reciprocating and rotatable shaft mounted in axial alinement with said mold, said shaft having a trough formed therein, whereby a charge of material from the receptacle may
20 be conveyed within the mold and deposited therein, substantially as set forth. 25

This specification signed and witnessed this 9th day of March 1907.

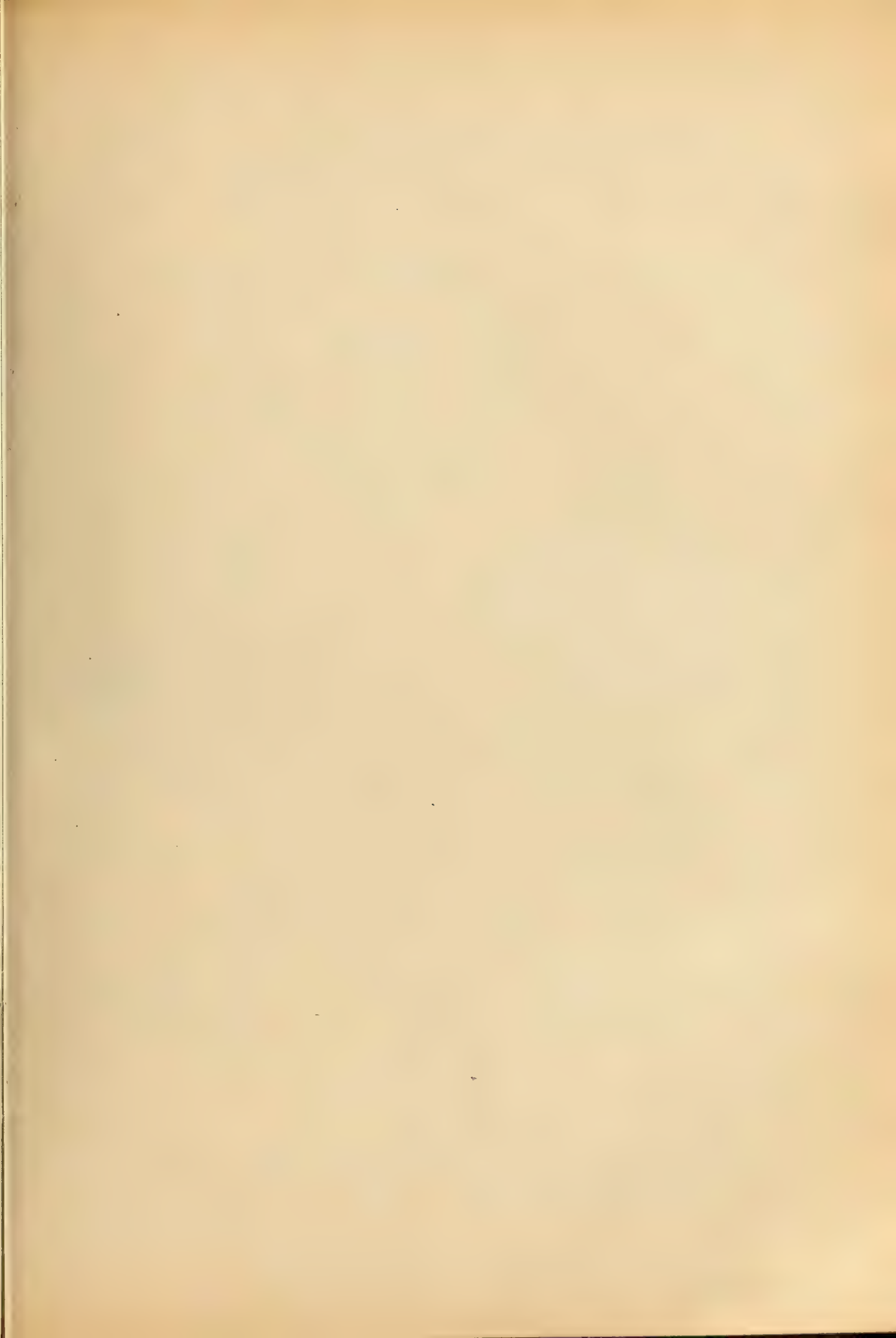
JONAS W. AYLSWORTH.

Witnesses:

FRANK L. DYER,

FRANK D. LEWIS.

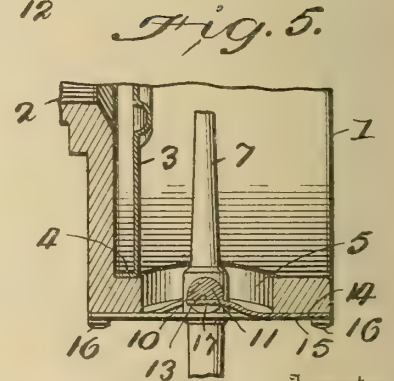
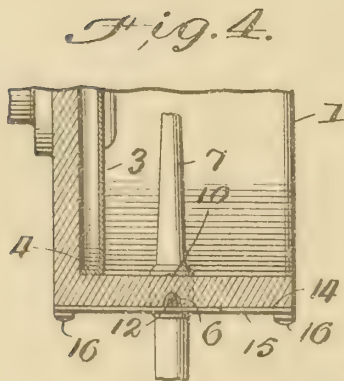
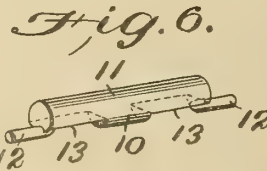
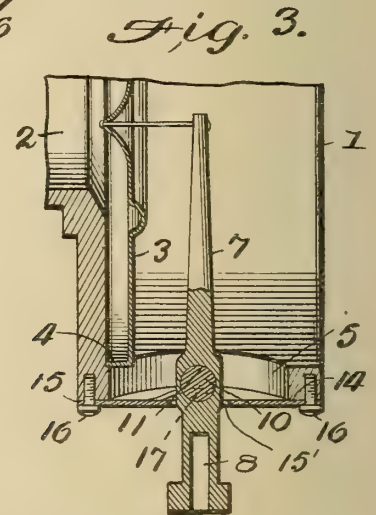
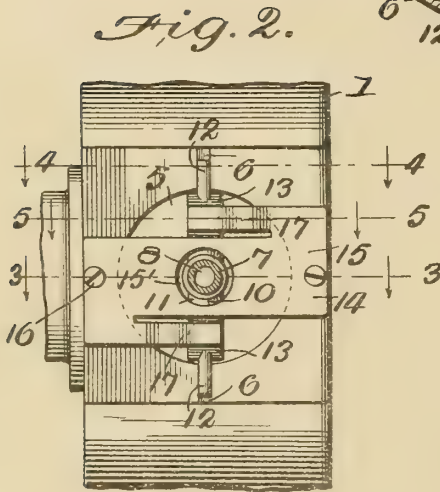
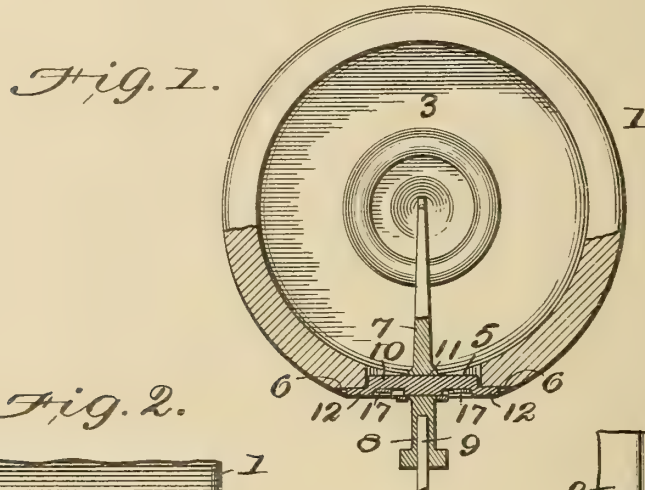




J. C. ENGLISH.
SOUND BOX FOR SOUND RECORDING AND REPRODUCING MACHINES.
APPLICATION FILED MAY 16, 1906.

940,794.

Patented Nov. 23, 1909.



Witnesses
F. C. Barry
Alfred B. Moulton

Inventor
John C. English
By *John C. English*

Attorney

UNITED STATES PATENT OFFICE.

JOHN C. ENGLISH, OF CAMDEN, NEW JERSEY, ASSIGNOR TO VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW JERSEY.

SOUND-BOX FOR SOUND RECORDING AND REPRODUCING MACHINES.

940,794.

Specification of Letters Patent.

Patented Nov. 23, 1909.

Application filed May 16, 1906. Serial No. 317,054.

To all whom it may concern:

Be it known that I, JOHN C. ENGLISH, a citizen of the United States, and a resident of the city of Camden, State of New Jersey, have invented certain new and useful Improvements in Sound-Boxes for Sound Recording and Reproducing Machines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to improvements in sound boxes for sound recording and reproducing machines, and some of the objects of my invention are, to provide a simple, durable and inexpensive mounting for a stylus bar; to provide an improved mounting for a stylus bar, which may be easily assembled or taken apart; to provide an improved mounting for a stylus bar, in which a tension will be applied to the bar to restrain the oscillation of the bar; and to provide other improvements as will appear hereinafter.

In the drawings, Figure 1 is an elevational view, partly in section, showing the stylus bar mounted upon the sound box casing in accordance with my invention; Fig. 2 is a bottom plan view of the same, part of the stylus bar being removed to show the mounting for the stylus bar; Fig. 3 is a vertical longitudinal section on the line 3—3 of Fig. 2; Fig. 4 is a vertical longitudinal section on the line 4—4 of Fig. 2; Fig. 5 is a corresponding section on the line 5—5 of Fig. 2 and Fig. 6 is a perspective view of the support upon which the stylus bar is mounted.

The sound box casing 1, may be of the usual opened end construction having an orifice 2 in the rear end thereof to which the sound conveying tube may be connected in any suitable manner. The diaphragm 3 may also be of any well known type, but I prefer to employ one in which the peripheral portions are turned at right angles to the face of the diaphragm to form a cylindrical flange 4 by which the whole diaphragm is stiffened and by which it is secured within the sound box, either by cement or by its contact with the walls of the casing. Through one side of the casing is provided an opening 5 which may be of any suitable shape, and on opposite sides of said opening, I provide grooves 6—6 preferably semi-cylindrical in cross-section and arranged in a plane parallel to the plane of the diaphragm.

Attached at its inner end to the diaphragm and passing through the opening 5 in the casing of the sound box, is the stylus bar 7, the lower end of said stylus bar being provided with the usual socket 8 in which the needle 9 may be secured in any well known manner. The stylus bar 7 is mounted on a stylus supporting rod or oscillatory support 10, which is preferably formed with a cylindrical middle portion 11, fitted tightly within a suitable opening in the stylus bar 7 as plainly indicated in Figs. 1 and 3, the rod being rigid with the bar. Each end of said stylus bar support is provided with journals 12—12, the axis of which is eccentric to the axis of the cylindrical portion 11 of the stylus bar support. These journals 12—12 are adapted to rest in the grooves 6—6 of the sound box casing, the walls of which form bearings on which the journals oscillate. Between the central cylindrical portion 11 of the stylus bar support and the said journals 12—12, I provide the stylus bar support with flattened portions or surfaces 13—13, and the plane of these surfaces when the sound box is in operative position is preferably slightly above the axis of oscillation of the stylus bar. While the surfaces of the groove 6—6 are preferably cylindrical or semi-cylindrical, the journals or trunnions 12—12 of the stylus bar support 10 may be either cylindrical and closely fit within said grooves or they may be substantially V shaped in cross section in order to reduce the friction between said journals and said bearing grooves. The latter form of journal is plainly shown in Figs. 4 and 6 and in this case the actual engaging surfaces of the grooves and trunnions will be cylindrical. This construction of journal and bearing is found materially to decrease the friction of said bearing and to result in imparting an increased sensitiveness to the stylus bar and consequently to the diaphragm secured thereto.

Secured to the sound box casing 1 is a spring 14, the object of which is to hold the stylus bar in its bearing grooves and also to apply a tension to the stylus bar. In the form of my invention disclosed in the drawings, this spring is best seen in Figs. 2 and 5. Therein the spring is shown as comprising a strip or plate 15, of thin spring metal secured at opposite ends by screws 16—16 to

the casing. On opposite sides of said body portion 15 and extending inward from the ends thereof, are leaf springs 17—17, the free ends of which are bent inwardly as shown in Fig. 5 and engage the flattened surfaces 13—13 of the stylus bar support. The main or body portion of the spring 15 is provided with a suitable aperture 15', through which the stylus bar passes.

10 In a sound box constructed and assembled in the manner above set forth, the springs 17—17 act upon the stylus bar support in a plane which is situated slightly above the axis of the oscillation of the stylus bar and consequently apply little tension to the stylus bar when the same is inoperative. When, however, the stylus bar begins to oscillate in transmitting vibrations between the needle and the diaphragm, the stylus bar support 10 will rock slightly and the outer edges of the flattened surfaces 13—13 will press against the springs 17—17, which in turn will tend to return the stylus bar to its normal position.

25 While I have in the above specification described in detail one embodiment of my invention, changes in details and arrangement of the various parts may be made without departing from the spirit and scope of my invention as pointed out in the appended claims.

What I claim as new and desire to protect by Letters Patent of the United States is:—

35 1. In a sound box for talking machines, a stylus bar, a stylus bar support provided with a flattened surface, journals on the ends of said support, and means pressing against said flattened surface and tending to force said surface away from the axis of oscillation of said bar for yieldingly holding said journals in position, and for applying tension to said stylus bar.

45 2. The combination with a sound box having grooves on one side thereof, a stylus bar, journals on which said stylus bar is mounted, resting in said grooves and a spring, connected at one end to said sound box, having its other end free to hold said journals within said grooves.

50 3. The combination with a sound box, a stylus bar and a stylus bar support by which said stylus bar is pivotally supported on said sound box, of a flat spring, rigidly connected at one end to said sound box and having its other end loosely pressing against said stylus bar support at a point spaced from the axis of oscillation of the said bar and in the direction from said axis toward which said spring is pressing as it acts upon said bar.

60 4. In a sound box for talking machines, a stylus bar, a stylus bar support provided with a flattened surface, journals on the ends of said support and a spring secured to said sound box and pressing against the flattened

surface of said support at a point upon said flattened surface in the direction of the pressure of said spring against said flattened surface from the axis of oscillation of the said bar.

70 5. In a sound box for talking machines a stylus bar, a stylus bar support provided with flattened surfaces, journals on the end of said support, and oppositely extending flat springs having one end of each secured to said sound box and having their free ends pressing against said flattened surfaces.

80 6. In a sound box for talking machines, a diaphragm, a stylus bar and stylus bar supporting rod, journals at the ends of said stylus bar supporting rod and upon which said stylus bar is adapted to oscillate and a spring secured to said sound box and engaging said stylus supporting rod at a point between its axis of oscillation and the said diaphragm.

85 7. The combination with a sound box provided on one side with an opening and with bearing grooves on either side of said opening, of a stylus bar extending through said opening, a stylus bar supporting rod, journals on the ends of said stylus bar supporting rod resting in said grooves and a spring secured to said sound box with its free end adapted to press against said stylus bar supporting rod at a point upon said bar in the direction toward which said free end is pressing against said bar from the axis of oscillation of the said bar.

100 8. The combination with a sound box provided on one side with an opening and with bearing grooves on either side of said opening, of a stylus bar, a stylus bar supporting rod, journals on the ends of said stylus bar supporting rod resting in said grooves and means for yieldingly holding said journals in said grooves and for applying a tension to said stylus bar.

110 9. In a sound box for talking machines, a stylus bar, a journal for said stylus bar and means to apply pressure upon said journal from a point upon said journal in the direction of said pressure upon said journal from the axis of oscillation of said bar.

115 10. In a sound box for talking machines, a stylus bar, a journal for said bar, and a spring to apply pressure upon said journal from a point upon said journal in the direction of said pressure upon said journal from the axis of oscillation of the said bar.

120 11. In a sound box for talking machines, a stylus bar, a journal for said bar, and a flat spring to apply a pressure upon said journal from a point upon said journal in the direction of said pressure upon said journal from the axis of oscillation of said bar.

125 12. In a sound box for talking machines, a stylus bar, an oscillatory support for said bar having a flattened surface upon one side thereof, and means to apply pressure upon

70

75

80

85

90

95

100

105

110

115

120

125

130

said flattened surface at a point in said flattened surface in the direction of the pressure upon said surface from the axis of oscillation of said bar.

5 13. In a sound box for talking machines, a stylus bar, a support for said bar provided with oppositely extending journals and flattened surfaces, and means to apply pressure upon said flattened surfaces, said surfaces
10 being arranged so that the application of the pressure is at points in said surfaces in the direction of the pressure upon said surfaces from the axis of oscillation of said bar.

14. In a sound box for talking machines,
15 a stylus bar, a support for said bar having oppositely extending journals and flattened surfaces and flat springs to apply pressure upon said flattened surfaces, said surfaces
20 being arranged so that the application of the pressure is at points in said surfaces in the direction of the pressure upon said flattened surfaces from the axis of oscillation of said bar.

15. In a sound box for talking machines,
25 a stylus bar, an oscillating support for said bar having flattened portions, and oppositely extending springs to apply pressure to said flattened portions.

16. In a sound box for talking machines,
30 a stylus bar, an oscillatory support for said bar having flattened portions, and oppositely extending springs pressing upon said flattened portions at points in the direction of the pressure upon said flattened portions
35 from the axis of oscillation of said support.

17. In a sound box for talking machines, a stylus bar, a rod supporting said stylus bar, journals at the ends of said rod upon which said rod is adapted to oscillate, and
40 oppositely extending springs pressing upon said rod.

18. In a sound box for talking machines, a stylus bar, a rod supporting said stylus bar, journals at the ends of said rod and
45 upon which said stylus is adapted to oscillate, and oppositely extending springs pressing upon said rod at points of said rod in the direction of the pressure upon said rod from the axis of oscillation of the said stylus
50 bar.

19. In a sound box for talking machines, a diaphragm, a flange extending substantially at right angles to said diaphragm and provided with an aperture extending there-
55 through and with grooves upon opposite sides of said aperture, a stylus bar extending through said aperture, a supporting rod for said stylus bar resting in said grooves, and means to hold said rod in said grooves.

60 20. In a sound box for talking machines, a diaphragm, a flange extending substantially at right angles to said diaphragm and provided with aperture extending there-
65 through and with grooves upon opposite sides of said aperture, a stylus bar extend-

ing through said aperture, a supporting rod for said stylus bar resting in said grooves, and oppositely extending springs having free ends arranged to hold said rod in said grooves.

21. In a sound box for talking machines, a flange provided with an aperture and having bearings upon opposite sides of said aperture, a stylus bar extending through said aperture, journals for said stylus bar
75 resting upon said bearings, and a spring and oppositely extending springs integral with said first-mentioned spring, to hold said journals upon the said bearings.

22. In a sound box for talking machines, 80 a flange provided with an aperture and having bearings upon opposite sides of said aperture, a stylus bar extending through said aperture, journals for said stylus bar resting upon said bearings, a spring having an
85 aperture through which said stylus bar extends, and oppositely extending springs integral with said first-mentioned spring to hold said journals upon the said bearings.

23. The combination with a sound box 90 having grooves on one side thereof, of a stylus bar, journals on which said stylus bar is mounted resting in said grooves, and a spring connected at one end to said sound box, and having its other end free to hold
95 said journals within said grooves by a pressure applied at a point upon said journals in the direction of the pressure upon said journals from the axis of oscillation of the said bar.

24. The combination with a sound box provided on one side with an opening, and with bearing grooves on either side of said opening, of a stylus bar extending through said opening, a rod supporting said
105 bar, journals on the ends of said rod resting in said grooves, and means for yieldingly holding said journals in said grooves and for applying a pressure to said stylus bar at a point in the direction of the pressure from
110 the axis of oscillation of said bar.

25. In a sound box, the combination with a casing having an aperture in one side thereof, of a stylus bar extending through said aperture and mounted upon said casing,
115 and a spring plate surrounding and contacting with said bar, and contacting with and secured to said casing for holding said bar upon its mounting.

26. In a sound box, the combination with 120 a casing having an aperture in one side thereof, of a stylus bar extending through said aperture and journaled upon said casing, and an apertured spring plate secured to said casing and surrounding said bar to
125 hold said bar yieldingly in position, said plate being provided with a spring arm integral therewith bearing against said bar, and extending transversely of the axis of oscillation thereof.

27. In a sound box, a stylus bar, a mounting therefor, and means surrounding said bar to hold the same upon the said mounting, said bar being held in a fixed position
5 longitudinally.

28. In a sound box, a stylus bar, a mounting therefor, and means surrounding said bar to hold the same upon the said mounting and to yieldingly resist the oscillation of the
10 said bar, said bar being held in a fixed position longitudinally.

29. In a sound box, a stylus bar, a mounting therefor, and a spring surrounding said bar to hold the same upon the said mounting,
15 said bar being held in a fixed position longitudinally.

30. In a sound box, a stylus bar, a mounting therefor, and a spring surrounding the said bar to hold the same upon the said
20 mounting, said bar being restrained to oscillate upon a fixed axis.

31. In a sound reproducer, a stylus bar mounted to oscillate on an axis transverse to the longitudinal axis of said bar, and a
25 spring to tension said bar surrounding said bar and exerting pressure normally in a line situated in a plane of the axis of oscillation of said bar.

32. In a sound reproducer, a stylus bar
30 fulcrumed on an axis transverse to the longitudinal axis of said bar, and a spring surrounding said bar for exerting pressure to tension said bar, said pressure being exerted normally in a line situated in a plane of the
35 longitudinal axis of said bar and in the plane of the axis of oscillation of said bar.

33. In a sound reproducer, a stylus bar fulcrumed on an axis transverse to the longitudinal axis of said bar, and a spring surrounding
40 said bar for exerting pressure to tension said bar, said pressure being exerted normally in a line situated in the plane of the longitudinal axis of said bar and in a plane transverse to the plane of oscillation
45 of said bar.

34. In a sound reproducer, a stylus bar mounted to oscillate on a pivotal bearing, a spring surrounding said bar for exerting
50 pressure normally in a line substantially coincident with the longitudinal axis of said bar.

35. In a sound box, a stylus bar, journals upon which said bar is mounted to oscillate, a spring surrounding said bar and exerting
55 a yielding pressure between said journals and said sound box.

36. In a sound box for talking machines,

a stylus bar, trunnions mounted on said sound box upon which said stylus bar oscillates, a spring surrounding said stylus bar
60 close to said trunnions and exerting a yielding pressure between said trunnions and said sound box.

37. In a sound box, a stylus bar, a mounting therefor restraining said bar to oscillate
65 in a single plane, and means surrounding said bar to hold the same upon the said mounting.

38. In a sound box, a stylus bar, a mounting therefor, restraining said bar to oscillate
70 in a single plane, and means surrounding said bar to hold the same upon the said mounting and to yieldingly resist the oscillation of the said bar.

39. In a sound box, a stylus bar, a mounting therefor restraining said bar to oscillate
75 in a single plane, and a spring surrounding the said bar to hold the same upon the said mounting.

40. In a sound box provided with an aperture in the casing thereof, a stylus bar extending through said aperture, a mounting
80 for said bar, and a spring interposed between the bar and the box to hold the bar upon its mounting, the longitudinal axis of said bar being normally substantially coincident with the longitudinal axis of said spring at the
85 mounting.

41. In a sound box provided with an aperture in the casing thereof, a stylus bar extending through said aperture, trunnions to support said stylus bar resting in grooves
90 provided therefor in said casing upon opposite sides of the said aperture, and a spring surrounding said bar to hold the said trunnions in said groove.

42. In a sound box, a stylus bar, a support for said bar mounted to oscillate on a fixed axis, and means to apply pressure at a point upon said support in the direction of
100 said pressure from said axis.

43. In a sound box, a stylus bar, a support for said bar mounted to oscillate on a fixed axis, and means to apply pressure at a point upon said support in the direction of said
105 pressure from said axis, said pressure increasing as the stylus bar is oscillated away from its normal position.

In witness whereof, I have hereunto set my hand this 15th day of May, A. D. 1906.
110 JOHN C. ENGLISH.

Witnesses:

CORA A. WITMER,
ALEXANDER PARK.

J. C. ENGLISH.
SOUND BOX FOR TALKING MACHINES.
APPLICATION FILED MAY 16, 1906.

940,795.

Patented Nov. 23, 1909.

Fig. 1.

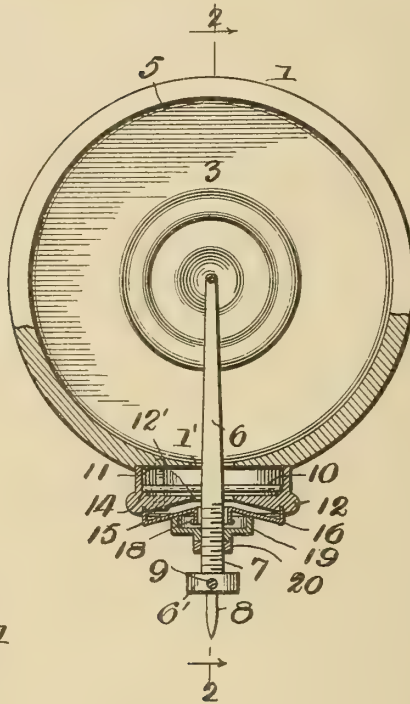


Fig. 3.

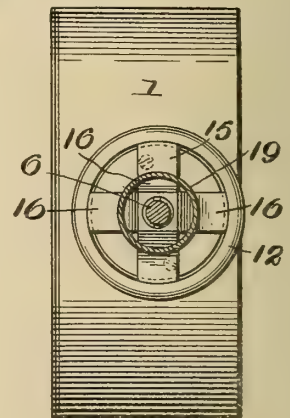


Fig. 2.

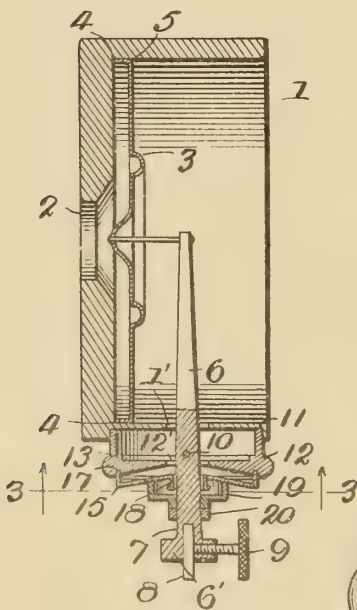


Fig. 4.

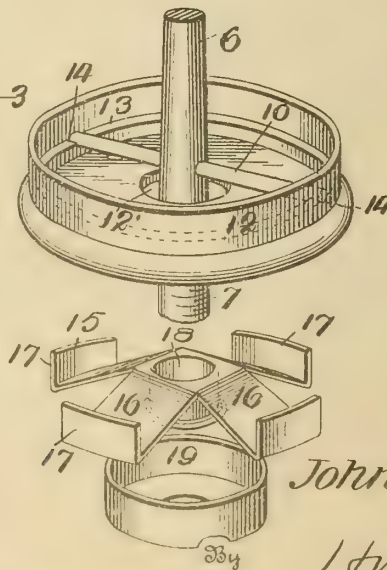
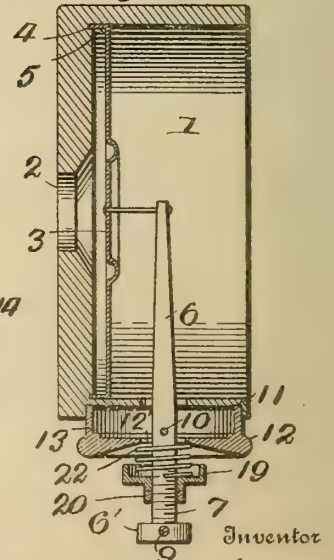


Fig. 5.



Witnesses
T. E. Baily
Attest & M. H. H. H. H.

John C. English

1 June 1910.

Attorney

UNITED STATES PATENT OFFICE.

JOHN C. ENGLISH, OF CAMDEN, NEW JERSEY, ASSIGNOR TO VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW JERSEY.

SOUND-BOX FOR TALKING-MACHINES.

940,795.

Specification of Letters Patent.

Patented Nov. 23, 1909.

Application filed May 16, 1906. Serial No. 317,055.

To all whom it may concern:

Be it known that I, JOHN C. ENGLISH, a citizen of the United States, and resident of the city of Camden, county of Camden, State of New Jersey, have invented certain new and useful Improvements in Sound-Boxes for Talking-Machines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawing, forming a part of this specification.

My invention relates to improvements in sound boxes, and the objects of my invention are, to provide an improved mounting for a stylus bar, in which an adjustable tension is exerted upon the bar to restrain the oscillation thereof; and to provide other improvements as will appear hereinafter.

In the drawing: Figure 1 is an elevation of my sound box, showing a part of the casing and stylus bar mounting mechanism in section; Fig. 2 is a sectional elevation thereof taken on lines 2—2 of Fig. 1; Fig. 3 is a bottom plan view of the sound box, showing a transverse section of the stylus bar mounting taken on line 3—3 of Fig. 2; Fig. 4 shows perspective views of several parts of the stylus bar mounting detached; and Fig. 5 is a sectional elevation of the sound box, showing a modified form of the stylus bar mounting.

The sound box casing 1 may be of the usual open end construction, having an orifice 2 in the rear end thereof, to which the sound tube may be connected. The diaphragm 3 may be of any well known type, but I prefer to employ one in which the peripheral portions are turned at right angles to the face of the diaphragm to form a cylindrical flange 4. The outer surface of the said flange is cemented or otherwise fastened to the inner wall of the sound box casing, so that the vibrations or fluctuations of the diaphragm will take place only within the peripheral edge 5, and the diaphragm is so mounted that it is tightly held within the wall of the sound box casing and has no moving contact surface. By reason of this construction, it will be observed that it is very easy to make a large number of sound boxes substantially identical in construction, at least to assemble the sound boxes so that the rear diaphragm is always at a predetermined distance from the rear wall of the

case, that is to say, from the wall which has a sound conveying opening 2 therein. The flange 4 enables the workman to do this without any special care and at the same time, the flange presents a simple means for attaching the diaphragm to the casing.

Attached to the diaphragm and passing through an orifice 1' in the side of the casing is a stylus bar 6, the outer end of which is screw threaded at 7, the purpose of which screw threads will be hereinafter set forth. The lower end of the stylus bar 6 is enlarged as at 6' and is provided with a suitable socket within which the needle 8 is secured by a set screw 9, or by any other suitable means. Passing through the stylus bar and rigidly fastened to the same is the trunnion or axial pin 10. In the outer side of the sound box casing and around the orifice through which the stylus bar passes is a cylindrical recess 11, within which the cylindrical cap 12 is located. The cap 12 is of a box-like construction, having an orifice 12' in its outer side, through which the stylus bar passes, and which is large enough to permit the necessary amplitude of vibration of the said bar. On the interior of said cap is an annular seat 13, having diametrical opposite grooves 14, in which rest the ends of the trunnion or axial pin 10. This seat 13 does not necessarily extend entirely around the interior of the cap 12, as it is merely for the purpose of presenting surfaces in which the diametrical oppositely arranged grooves 14 may be located. The axial pin 10 is held within the grooves 14 by means of the spring 15. The spring may be formed of a circular blank stamped out to form the radially extending blades 16, the outer ends of which are turned inwardly as shown at 17. The central portion of the spring is apertured and drawn outwardly into a cylindrical collar 18, which surrounds the stylus bar, but is large enough to permit the necessary amplitude of vibration of the same. The intumed edges 17 of the spring are located in depressions in the outer end of the cap, to prevent rotary movement of the spring. The spring is so constructed that the central portion has a tendency to spring outwardly; that is, when the said central portion is pressed inwardly toward the seat, it offers a yielding resistance. Located loosely around the stylus bar is the head 19, which is adapted

ed to be moved inwardly against the spring by the nut 20. Thus, when the head is forced inwardly by means of the nut, the spring 15 resists said inward movement of the same, which resistance causes the stylus bar and its axial pin to be drawn outwardly, thus exerting a yielding pressure on the bearing grooves 14.

The construction illustrated in Fig. 5 is the same as that of the remaining figures with the exception that a coil compression spring 22 surrounds the stylus bar and has a normal tendency to pull the same, with the axial pin 10 outwardly from the sound box, and exerts pressure on the grooves 14 in the same manner as the spring 16 in the other figures. It may be readily seen that by virtue of this peculiar mounting of the stylus bar the latter vibrates upon yielding bearings, the yielding pressure being exerted in a plane which passes through both the axis of the trunnion pin and that of the stylus bar. The inwardly depressed outer face of the cap 12 enables the pressure of the spring on the stylus bar to be brought near to its axis of oscillation and renders the stylus bar free to respond to the vibrations impressed upon it while at the same time, the trunnions 10 are firmly held against their bearings in the cap 12. It is obvious that the outer end of the stylus beyond the nut 20 may have a downwardly projecting elbow therein, as it is sometimes required when the stylus extends over the edge of the sound box casing instead of projecting through the orifice in the same. Further, it is not essential that the pressure against the bearings should be exerted in a plane passing through the longitudinal axis of the stylus, as the construction may be so modified as to have the pressure exerted in a plane transverse thereto.

Other changes in the details and arrangement of the various parts may be made without departing from the spirit and scope of my invention, as pointed out in the appended claims.

What I claim as new and desire to protect by Letters Patent of the United States, is:—

1. In a sound reproducer, the combination with the diaphragm of a stylus bar mounted to oscillate upon a pivotal bearing, compressed spring for tensioning said bearing, the axis of said spring being substantially in a plane of the axis of oscillation of said bar and substantially coincident with the longitudinal axis of the stylus bar at its bearing.

2. In a sound reproducer, the combination with the diaphragm of a stylus bar mounted to oscillate upon pivotal bearings and a compressed spring for tensioning said bearings, the longitudinal axis of said spring being substantially coincident with the longitudinal axis of said bar, the said bar having a

projection against which one end of the spring bears to hold the pivots upon their bearings.

3. In a sound box for talking machines, a stylus bar, trunnions mounted on said sound box upon which said stylus bar oscillates, a spring surrounding said stylus bar close to said trunnions and exerting a yielding pressure between said trunnions and said sound box tending to force said bar outwardly from said box.

4. In a sound box for talking machines, a stylus bar, trunnions bearing against said sound box and upon which said stylus bar oscillates, a spring comprising a collar surrounding said stylus bar, radial arms engaging said sound box, and means to exert a tension on said spring in the direction of the longitudinal axis of said stylus bar.

5. In a sound box for talking machines, a stylus bar, trunnions bearing against said sound box and upon which said stylus bar oscillates, a spring comprising a collar surrounding said stylus bar, radial arms engaging said sound box, and means also mounted on said stylus bar to exert a tension on said spring in the direction of the longitudinal axis of said stylus bar.

6. In a sound recording and reproducing device, a sound box casing, a stylus bar extending through an orifice in the side of said casing, a hollow cylindrical cap having bearing surfaces therein and upon which the said stylus bar is adapted to oscillate upon a transverse axis, a head attached to said stylus beyond said cap and a compression spring arranged between said cap and said head to hold the cap against the side of the casing and the stylus bar upon its bearing surfaces.

7. In a sound recording and reproducing device, a sound box casing having an aperture in the side thereof, a circular cap having bearing seats therein covering said orifice, the said circular cap having an aperture substantially in alinement with the aperture in the casing, a stylus bar extending through said apertures and having a transverse axial bearing, a head upon said stylus bar beyond said cap and a compression spring arranged between said head and said cap whereby the latter is held in engagement with the casing, and the axial bearing of the stylus is held under tension.

8. In a sound recording and reproducing device, the combination with a sound box casing of a stylus bar, a cap having an orifice therein engaging the outer wall of said casing, bearing surfaces within said cap, means for mounting said stylus bar upon said bearing surfaces, the said stylus bar extending through said orifice in the cap and having a head mounted thereon outside the same, and a compression spring arranged between said cap and said head to hold

the cap in engagement with said casing and to hold the mounting means in engagement with the bearing surfaces.

9. In a sound box, a stylus bar, a mounting therefor restraining said bar to oscillate in a single plane, and a compressed spring surrounding the said bar to hold the same upon the said mounting.

10. In a sound box, a stylus bar, a mounting therefor restraining said bar to oscillate in a single plane, and a compressed spring for tensioning said bar upon its mounting, the longitudinal axis of said spring being normally substantially coincident with the longitudinal axis of the said bar at the mounting.

11. In a sound box, a stylus bar, a mounting therefor, and a spring collar surrounding said stylus bar and having radial arms engaging the said sound box to hold the said stylus bar upon its mounting.

12. In a sound box, a stylus bar, a mounting therefor, and a spring collar surrounding said stylus bar and having radial arms engaging in grooves and provided therefor in the said sound box to hold the said stylus bar upon its mounting.

13. In a sound box, a stylus bar, a mounting therefor, a spring collar surrounding said stylus bar, and a head threaded upon said stylus bar and engaging said spring collar to compress the same to hold the said stylus bar upon its mounting.

14. In a sound box, a stylus bar, a mounting therefor, and a compressed spring surrounding the said bar to hold the same upon the said mounting, said bar being held in a fixed position longitudinally.

15. In a sound box, a stylus bar, a mount-

ing therefor, and a compressed spring for tensioning said bar upon its mounting, the longitudinal axis of said spring being normally substantially coincident with the longitudinal axis of the said bar at the mounting, said bar being held in a fixed position longitudinally.

16. In a sound reproducer, a stylus bar mounted to oscillate on a fixed axis, and a compressed spring surrounding said bar for exerting pressure normally in a plane of said axis of oscillation, to tension said bar.

17. In a sound box, the combination with the casing, of a stylus bar mounted thereon, and means exerting pressure on said stylus bar tending to force said bar longitudinally away from said sound box casing.

18. In a sound box, the combination with the casing, of a stylus bar, trunnions on said bar, bearings for said trunnions, and means exerting pressure on said stylus bar to hold said trunnions in said bearings and tending to force said bar longitudinally away from said sound box casing.

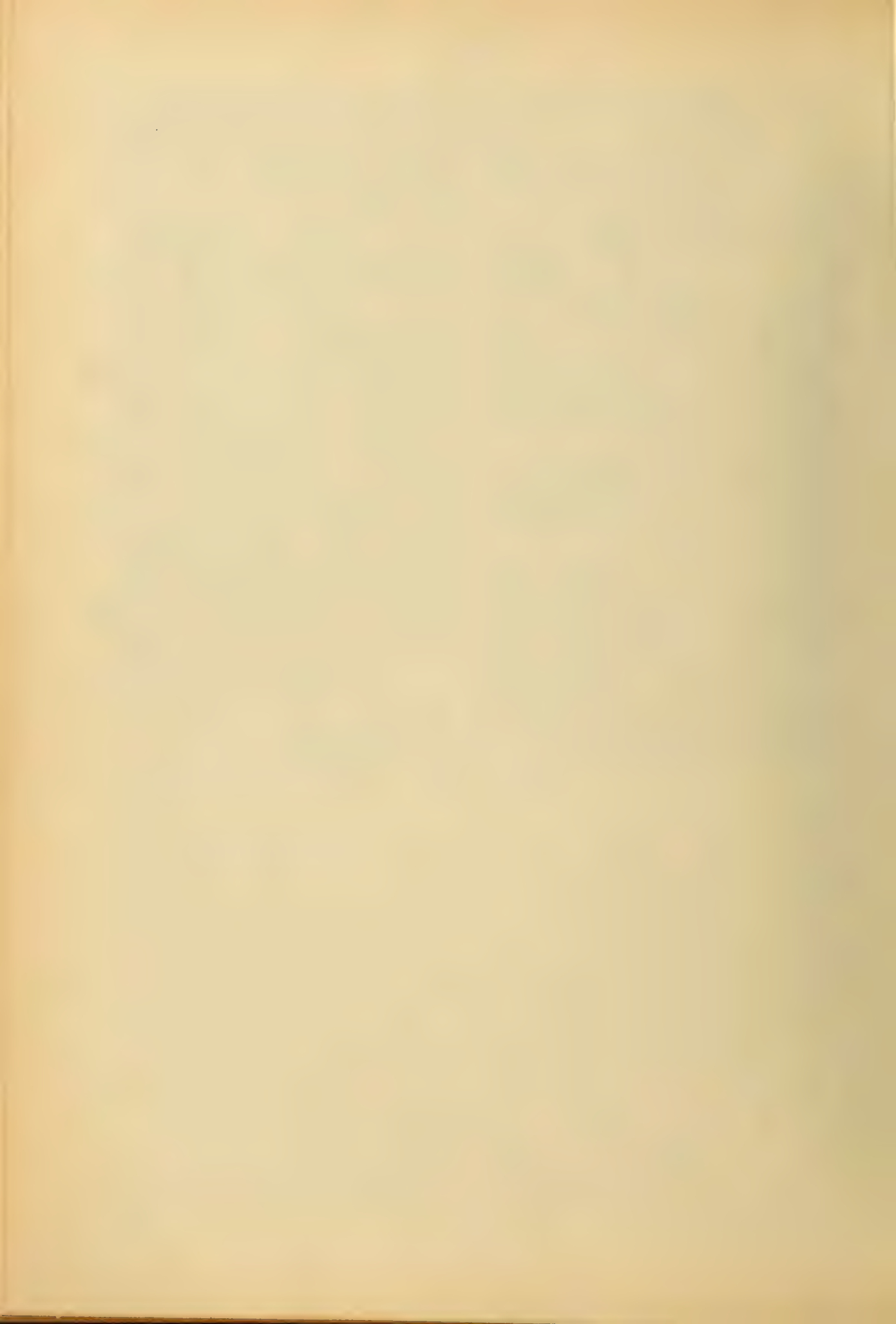
19. In a sound box, the combination with the casing, having a sound conveying opening in the one wall thereof, of a diaphragm having means integral therewith engaging said wall, to determine the position of said diaphragm with respect to said wall and to retain the said diaphragm in position in said casing.

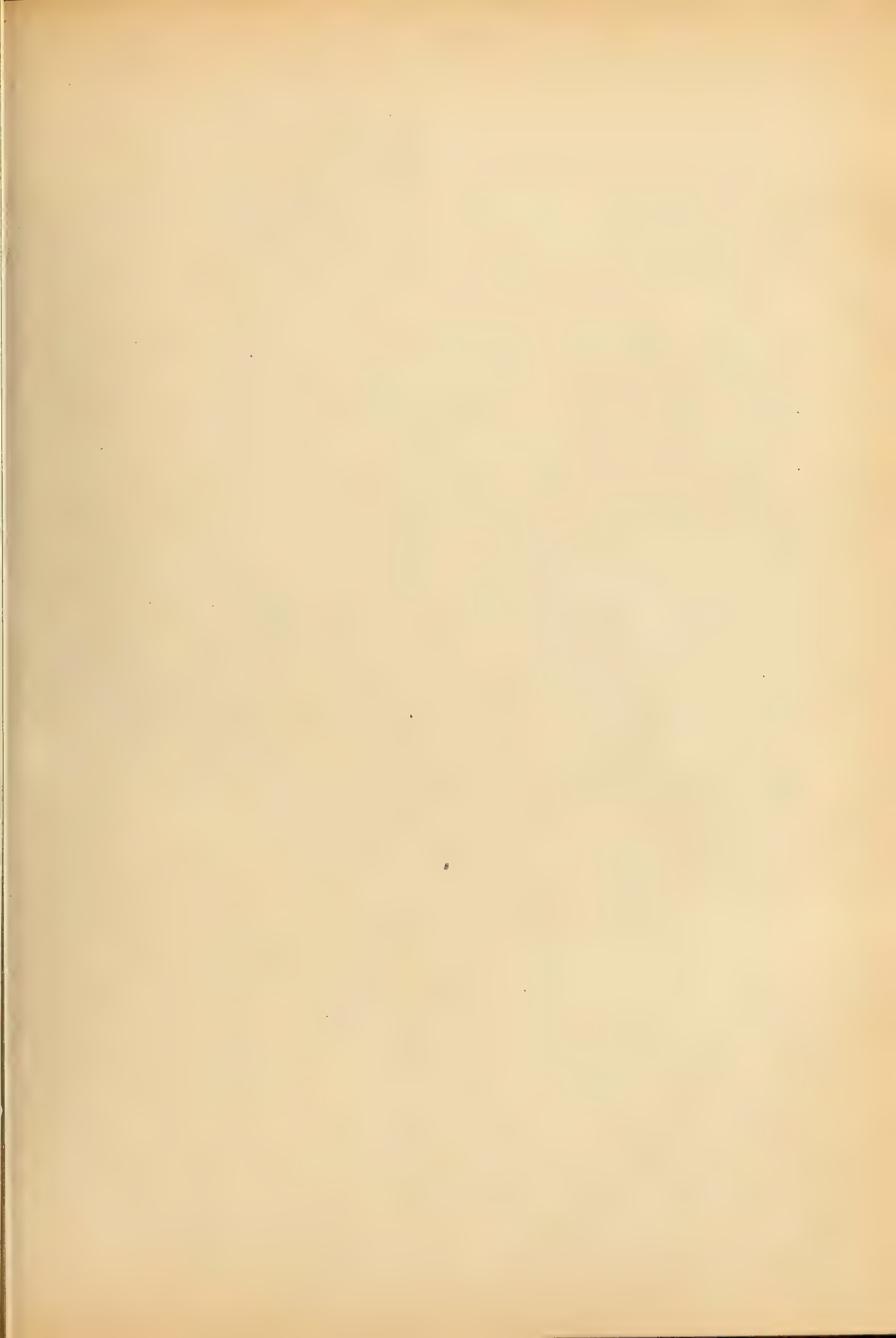
In witness whereof, I have hereunto set my hand this 15th day of May, A. D. 1906.

JOHN C. ENGLISH.

Witnesses:

CORA A. WITMER,
ALEXANDER PARK.





J. C. ENGLISH.
SOUND BOX FOR SOUND RECORDING AND REPRODUCING MACHINES.
APPLICATION FILED MAY 31, 1906.

940,796.

Patented Nov. 23, 1909.

Fig. 1.

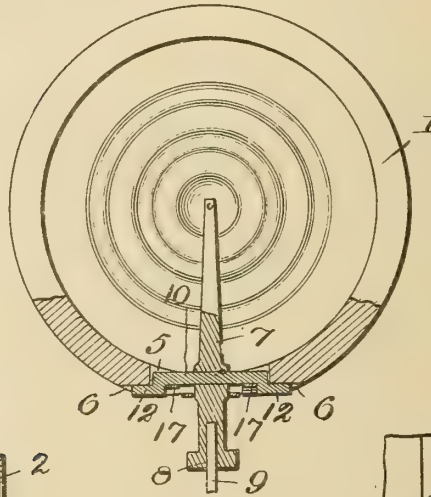


Fig. 2.

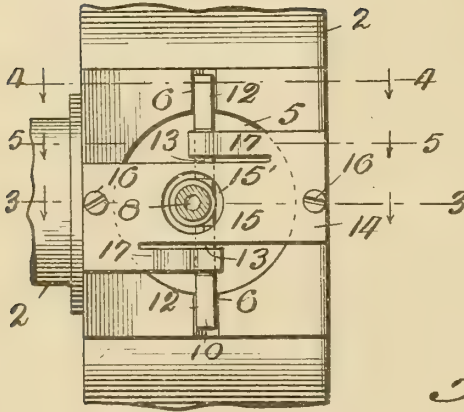


Fig. 3.

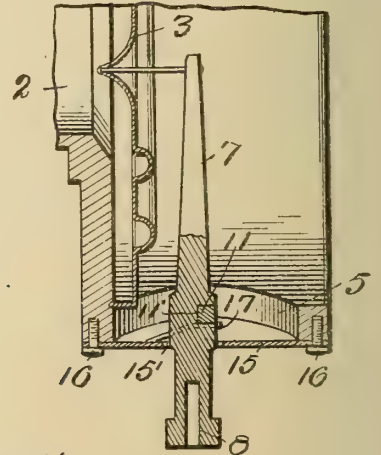


Fig. 6.

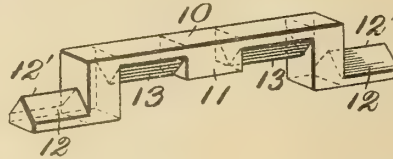


Fig. 4.

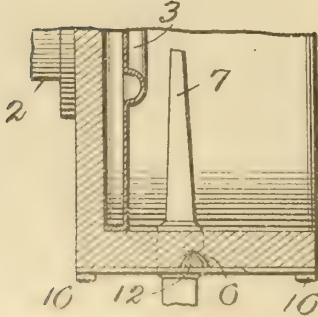
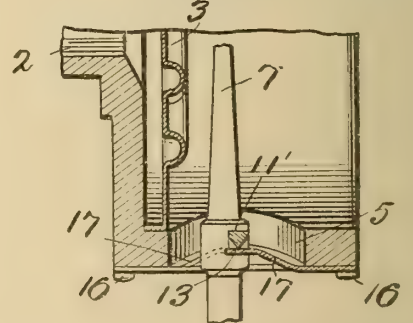


Fig. 5.



WITNESSES:

F. E. Barry
Alston & Moulton

INVENTOR

John C. English
BY *10 me. [Signature]*
ATTORNEY

UNITED STATES PATENT OFFICE.

JOHN C. ENGLISH, OF CAMDEN, NEW JERSEY, ASSIGNOR TO VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW JERSEY.

SOUND-BOX FOR SOUND RECORDING AND REPRODUCING MACHINES.

940,796.

Specification of Letters Patent.

Patented Nov. 23, 1909.

Application filed May 31, 1906. Serial No. 319,426.

To all whom it may concern:

Be it known that I, JOHN C. ENGLISH, a citizen of the United States, and a resident of the city of Camden, State of New Jersey, have invented certain new and useful Improvements in Sound-Boxes for Sound Recording and Reproducing Machines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to improvements in sound boxes; and the objects of my invention are, to provide a simple and durable mounting for a stylus bar by which the bar will be held yieldingly in place to oscillate without restraint upon a fixed axis; and to provide other improvements as will appear hereinafter.

In the drawings, Figure 1 is an elevational view, partly in section, showing the stylus bar mounted upon the sound box casing in accordance with my invention; Fig. 2 is a bottom plan view of the same, part of the stylus bar being removed to show the mounting for the stylus bar; Fig. 3 is a vertical longitudinal section on the line 3—3 of Fig. 2; Fig. 4 is a vertical longitudinal section on the line 4—4 of Fig. 2; Fig. 5 is a corresponding section on the line 5—5 of Fig. 2 and Fig. 6 is a perspective view of the support upon which the stylus bar is mounted.

The sound box casing 1, may be of the usual opened end construction having an orifice 2 in the rear end thereof to which the sound conveying tube may be connected in any suitable manner. The diaphragm 3 may also be of any well known type, but I prefer to employ one in which the peripheral portions are turned at right angles to the face of the diaphragm to form a cylindrical flange 4 by which the whole diaphragm is stiffened and by which it is secured within the sound box, either by cement or by its contact with the walls of the casing.

Through one of the sides of the casing is provided an opening 5, which may be of any suitable shape and of a size to permit the insertion of the stylus bar therethrough and on opposite sides of the said opening I provide grooves 6 of any suitable cross section, and arranged in a plane parallel to the plane of the diaphragm.

Attached at its inner end to the diaphragm and passing through the opening 5 in the casing of the sound box, is the stylus bar 7, the lower end of said stylus bar being provided with the usual socket 8 in which the needle 9 may be secured in any well known manner.

The stylus bar 7 is mounted on a stylus supporting bar 10, which in this instance is formed of a square rod bent into substantially a U-shape, as shown in Fig. 6. The middle of this stylus supporting bar 10 is left square as at 11, and is tightly fitted within a notch 11' cut in the side of the stylus bar. The stylus bar support may be retained in said notch either by being braced therein, or by a pin, as desired. The outer ends 12 of the stylus bar support are provided with knife edges 12' adapted to be seated in the grooves or bearings 6 in the sound box casing, and on either side of the square portion 11 of the stylus bar support I provide reversed knife edges 13 which are in alinement with the knife edges 12'. While I have shown the stylus bar support as made of a rod square in cross section, the said support may be made of any desired section, so long as it can be rigidly secured to the stylus bar, and can be provided with a surface which when engaged by the spring, or other yielding means, will be held within its bearings without offering any resistance to the free oscillation of the stylus bar.

Secured to the sound box casing 1 is a spring 14, the object of which is to yieldingly hold the knife edges 12' within the grooves 6 of the sound box casing. The form of spring which I have especially adapted for this purpose consists of a strip or plate of thin spring metal secured at opposite ends to the sound box casing by screws 16 16. On opposite sides of said body portion 15, and extending lengthwise of the body portion in opposite directions and inwardly, are leaf springs 17 17, the free ends of which are bent upwardly as shown in Fig. 5, to engage the knife edges 13—13 of the stylus bar support, the springs extending transversely of the knife edges. The main or body portion of the spring 15 is provided with a suitable aperture 15' through which the stylus bar passes. Instead of the leaf spring for holding the stylus bar within its bearings, any other form

of spring which will perform the same functions may be used without departing from the spirit of my invention.

5 In a sound box constructed and assembled in the manner above set forth the springs 17—17 act upon the stylus bar support on a knife edge which is in alinement with the knife edges upon which the stylus bar oscillates. As the stylus oscillates, there is no
10 relative motion between the stylus bar support and the springs 17—17, which hold the stylus bar support within its bearings; that is to say, the function of the spring is merely to hold the stylus bar support in position
15 on the sound box without applying any tension to the stylus bar or offering any resistance to the tendency of the same to freely oscillate upon its bearings in response to the vibrations transmitted through the
20 same.

While I have in the above specification described in detail one embodiment of my invention, changes in details and arrangement of the various parts may be made without departing from the spirit and scope of
25 my invention as pointed out in the appended claims.

What I claim as new and desire to protect by Letters Patent of the United States is:—

30 1. In a sound box, the combination with a stylus bar provided with a knife edge, of a mounting for said stylus bar, and a spring arm extending transversely of and bearing against said knife edge to hold said bar upon
35 its mounting.

2. In a sound box, the combination with a casing having an aperture in one side thereof, of a stylus bar extending through

said aperture and journaled upon the outside of said casing, and an apertured plate
40 secured to the outside of said casing and surrounding said bar to hold said bar yieldingly in position, said plate being provided with a spring arm integral therewith and bearing against a knife edge provided there-
45 for on said bar, and extending transversely of said knife edge.

3. In a sound box, the combination with a stylus bar, of a mounting therefor and an apertured plate surrounding said bar, said
50 plate being provided with oppositely extending spring arms integral therewith and extending transversely of and contacting with knife edges provided on said stylus bar to hold said bar upon its mounting.
55

4. In a sound box, the combination with a casing provided with an aperture in one side thereof, of a stylus bar extending through said aperture, trunnions carried by said bar and mounted to oscillate in grooves pro-
60 vided therefor in the surface of the sound box casing, and a spring plate provided with an aperture through which said bar extends, said plate being secured to said cas-
65 ing and being provided with spring arms integral therewith and bearing against and extending transversely of knife edges provided therefor upon said trunnions to hold said bar yieldingly in position.

In witness whereof I have hereunto set
70 my hand this 28th day of May, A. D. 1906.

JOHN C. ENGLISH.

Witnesses:

ALEXANDER PARK,
ALSTON B. MOULTON.

G. K. CHENEY.
PROCESS OF RECORDING SOUND.
APPLICATION FILED DEC. 12, 1902.

941,010.

Patented Nov. 23, 1909.

Fig. 1.

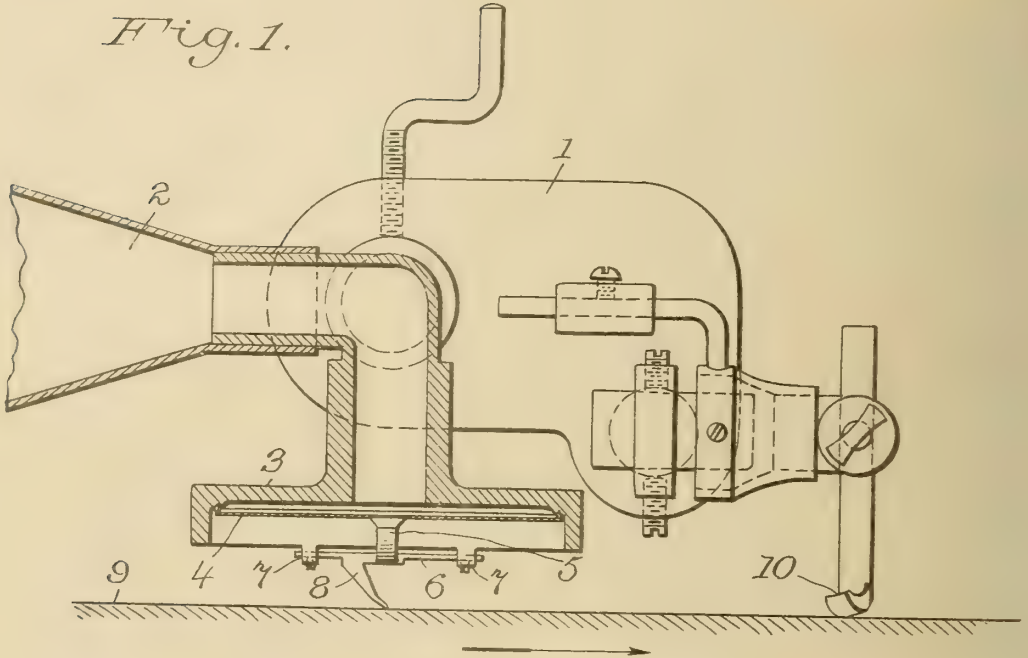


Fig. 2.

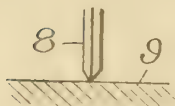


Fig. 3.

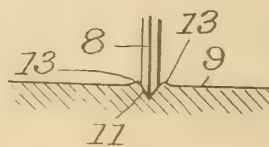


Fig. 4.

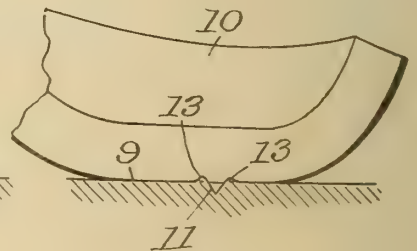
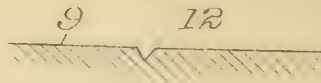


Fig. 5.



WITNESSES:

W. G. Crawford
W. H. Humphrey.

INVENTOR

George K. Cheney

BY

W. H. Humphrey

ATTORNEY

UNITED STATES PATENT OFFICE.

GEORGE K. CHENEY, OF NEW YORK, N. Y., ASSIGNOR, BY MESNE ASSIGNMENTS, TO
VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW JERSEY.

PROCESS OF RECORDING SOUND.

941,010.

Specification of Letters Patent.

Patented Nov. 23, 1909.

Application filed December 12, 1902. Serial No. 134,914.

To all whom it may concern:

Be it known that I, GEORGE K. CHENEY, a citizen of the United States of America, and a resident of the borough of Manhattan, city, county, and State of New York, have invented certain new and useful Improvements in Processes of Recording Sound, of which the following is a specification.

The main object of this invention is to provide an improved process for producing a true sound record from which may be obtained a faithful reproduction of sound.

Heretofore, it has been common in the art to make a sinuous line, representing sound waves, on photographic material or in a film upon the surface of a metal plate, and then by chemical action to form a corresponding line in a tablet; and the method has also been practiced of cutting or engraving such a line in a tablet of suitable nature. All of these methods are considered by me to be objectionable, however, to a more or less extent, in that it has been suggested that the final record grooves are liable to have rough places and irregularities which may result from the methods of their formation.

In the chemical process of forming records, the action of the reagent is uneven on account of local differences in the structure of the record blank, upon which it acts, and therefore the surfaces of the grooves formed thereby are not true and are cellular or pitted, which results in an unpleasant scratching sound during the reproduction of the record.

In the engraving method, the record blank is usually formed of a more or less waxy and tenacious material, which, when not made homogeneous is liable to cause the engraving tool, which removes, in the form of chips or shavings, a portion of the record blank to form the record groove to leave the record groove with surfaces more or less uneven, because the harder particles of the tablet material may be torn or dragged from their positions instead of being cut cleanly through by the edges of the tool.

The aim of my invention is to dispense with any chemical action and any cutting, scraping or gouging action of the recording tool itself, substituting therefor a pressing or ironing action of the tool.

One form of apparatus for carrying out

my improved method is illustrated in the accompanying sheet of drawings in which:

Figure 1 is a side elevation partially in section of the recording apparatus shown in its relation to the recording tablet; Fig. 2 an enlarged front view of the recording tool point; Fig. 3 a similar enlarged view showing the recording tool in operative position, and the shape of the groove formed thereby in the record tablet; Fig. 4 an enlarged front view of the paring knife in action removing the raised edges of the groove; and Fig. 5 is an enlarged cross section showing the completed groove.

Referring to the drawings in which the same references are used throughout the various views to designate the same part, the supporting frame 1 carries a horn 2 and a sound box 3. The sound box is provided with the usual diaphragm 4, to the center of which is attached the inner end 5, of a bell crank arm, which is mounted on the torsional shaft 6. The ends of the torsional shaft are rigidly set in sockets 7, 7 fixed on the sound box casing.

The recording point 8 is carried by the torsional shaft 6 and is caused to vibrate laterally by the vertical vibration of the diaphragm acting through the bell crank arm 5, carried thereby. The extremity of the recording point 8 is inclined rearwardly in the direction of the motion of the record tablet as shown in Fig. 1, and is wedge shaped in cross section as shown in Figs. 2 and 3.

The surface 9 of the record tablet is formed of some suitable displaceable material. This may be a composition of soap-like or wax-like construction, or it may be of soft metal such as lead or other material the molecules of which are capable of being moved one upon another and partially displaced by such pressure as the recording tool is able to give without too greatly straining the parts of the mechanism.

Upon the frame 1, and behind the recording tool 8, is adjustably mounted a paring knife 10, whose cutting edge just clears the surface of the tablet 9, when the surface is in its original flat condition.

Figs. 3 and 4 represent at 11, the record groove in process of formation; and Fig. 5 represents at 12, the completed sound record groove.

For forming records, the parts are so adjusted that the point of the recording tool 8 sinks into the record tablet as represented in Fig. 3, and the paring knife 10 barely touches the plane surface of said record tablet, as indicated in Fig. 4. Motion being given to the record tablet in the direction of the arrow, and sound waves being projected into the horn 2, the usual vibrations of the recording tool are produced and as the tablet 8 advances, a sinuous line of even depth is formed in the tablet. On account of the backward rake or inclination of the recording tool 8, shown in Fig. 1, the tool does not cut or gouge or scrape out the material of the tablet 9 as the same passes by it, but presses the material downwardly and toward each side, ironing out a groove 11 having raised burs or ridges, 13, 13, on the sides. The paring knife 10, following after in proper adjustment, pares off the burs or ridges 13, 13, leaving a flat upper surface to the record as shown in Fig. 5.

The master record so made may be used for direct reproduction if the material employed is sufficiently hard, or duplicates of the master record may be made in any well known manner.

Another advantage of the ironing action of the recording tool, which forms a record groove with smooth walls, the surfaces of which are formed of material denser and harder than the rest of the tablet, inasmuch as it has been packed and ironed down by the tool, and which are free from any cellular or pitted formation such as may be produced by a gouging, or tearing, or scraping action of a cutting or a more indenting tool.

Wherever in the specification or claims I use the expressions "pressing", "impressing", "ironing", or the like, relative to the action of my tool on the moving tablet, I mean thereby to define the function of the tool in forming a groove in the manner above described, that is, without cutting, or tearing, or gouging or scraping out of particles of the record material.

It is evident, of course, that various changes might be made in the details of the process above described without departing from the spirit or scope of my invention. For instance, the paring down of the bur or ridges might be done as a separate operation; other forms of recording tool might be employed so long as the necessary backward inclination is retained to give the scoring and ironing action described and avoid any cutting or paring; the second step of the process, the paring down of the ridges 13, 13, might be omitted and a fairly accurate reproduction still be obtained, but these and similar modifications, however, would still leave the process within the boundaries of my invention.

Having thus described my invention, I

claim as new and desire to protect by Letters Patent of the United States:

1. The method of recording sound waves, which comprises vibrating a stylus by means of sound waves, impressing a sinuous groove in a record blank of displaceable material, by forcing by means of said stylus a depression therein having smoothed or ironed surfaces.

2. The method of recording sound waves, which comprises vibrating a stylus by means of sound waves, impressing a sinuous groove in a record blank of displaceable material, by forcing by means of said stylus said material upwardly and laterally under pressure which smooths or irons the surfaces of said groove.

3. The method of recording sound waves, which comprises vibrating the stylus by means of sound waves, impressing a sinuous groove in a record blank of displaceable material, by gradually increasing the depth of said groove by means of said stylus through downward and lateral pressure.

4. The method of recording sound waves, which comprises vibrating a stylus by means of sound waves, impressing a sinuous groove in a record blank of displaceable material by means of said stylus, the angle of the walls of said groove being acute, whereby the material of the tablet is displaced laterally and upwardly.

5. The method of recording sound waves, which comprises vibrating a stylus by means of sound waves, impressing an acute V-shaped sinuous groove in a tablet of displaceable material by means of said stylus, by displacing said material laterally and upwardly, and removing the material displaced above the normal surface of the tablet.

6. The method of recording sound waves, which comprises the following steps: (1) forming a sinuous groove in a record blank of displaceable material, by displacing said material transversely and upwardly by means of a stylus vibrated by sound waves, and (2) paring away the material displaced above the normal surface of the tablet.

7. The method of recording sound waves, which comprises the following steps: (1) impressing a sinuous groove in a tablet of displaceable material, by displacing said material transversely and upwardly on each side of said groove by means of a stylus vibrated by sound waves, and (2) cutting away the material displaced so that the same is level with the normal surface of the tablet.

8. The method of recording sound waves which comprises vibrating a tool in accordance with sound vibrations and forming by means of said tool a groove having an ironed surface, in a record blank of displaceable material.

9. The method of recording sound waves

which comprises forming a groove, having an ironed surface corresponding to sound waves, in a record blank of displaceable material.

5 10. The method of recording sound waves which comprises forming a groove, having a smooth or ironed surface corresponding to sound waves in a record blank of displaceable material, and cutting away displaced
10 material at the edge of said groove.

11. The method of recording sound waves which comprises forming a sinuous depression corresponding to sound waves in a record blank of displaceable material, and then
15 cutting away displaced material at the edge of said depression.

12. The method of recording sound waves which comprises forming a sinuous depression having a compressed surface corresponding to sound waves, in a record blank
20 of displaceable material.

13. The method of recording sound waves which comprises forming a sinuous depression having a compressed surface corresponding to sound waves in a record blank
25 sponding to sound waves in a record blank

of displaceable material, and cutting away displaced material at the edge of said depression.

14. The method of recording sound waves which comprises forming a groove corresponding to sound waves in a record blank and then removing a portion of the surface of said blank adjacent to said groove. 30

15. The method of recording sound waves which comprises forming a groove corresponding to sound waves in a record blank and then cutting away a portion of the surface of said blank adjacent to said groove. 35

16. The method of recording sound waves which comprises forming a groove corresponding to sound waves in a record blank and then shearing away a portion of the surface of said blank adjacent to said groove. 40

Signed at New York, N. Y. this 25th day of November 1902.

GEORGE K. CHENEY.

Witnesses:

W. H. PUMPHREY,

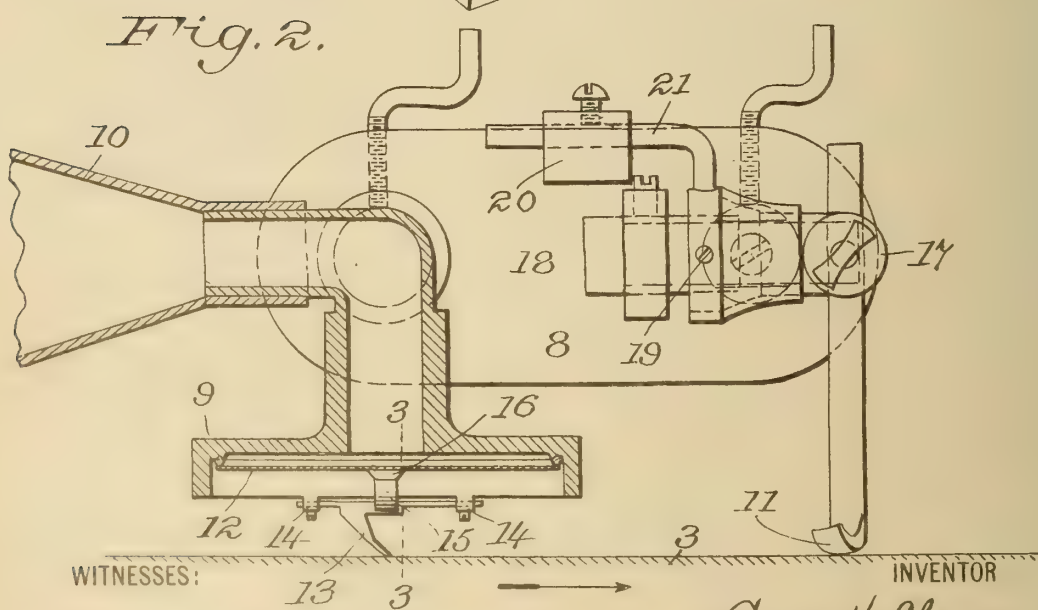
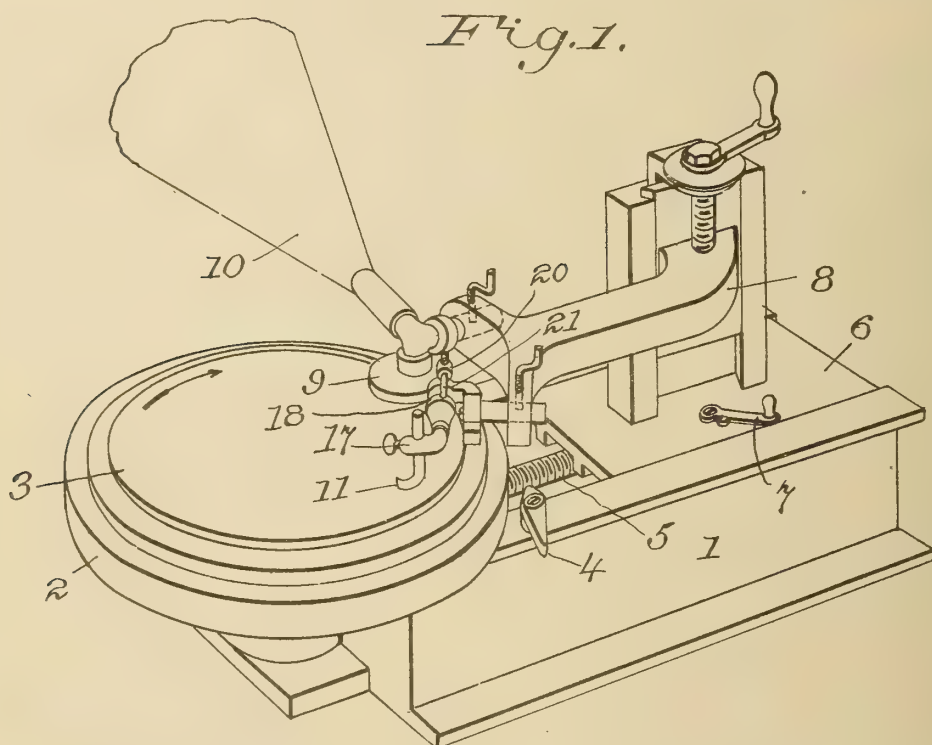
M. G. CRAWFORD.



G. K. CHENEY.
 APPARATUS FOR RECORDING SOUND.
 APPLICATION FILED DEC. 12, 1902.

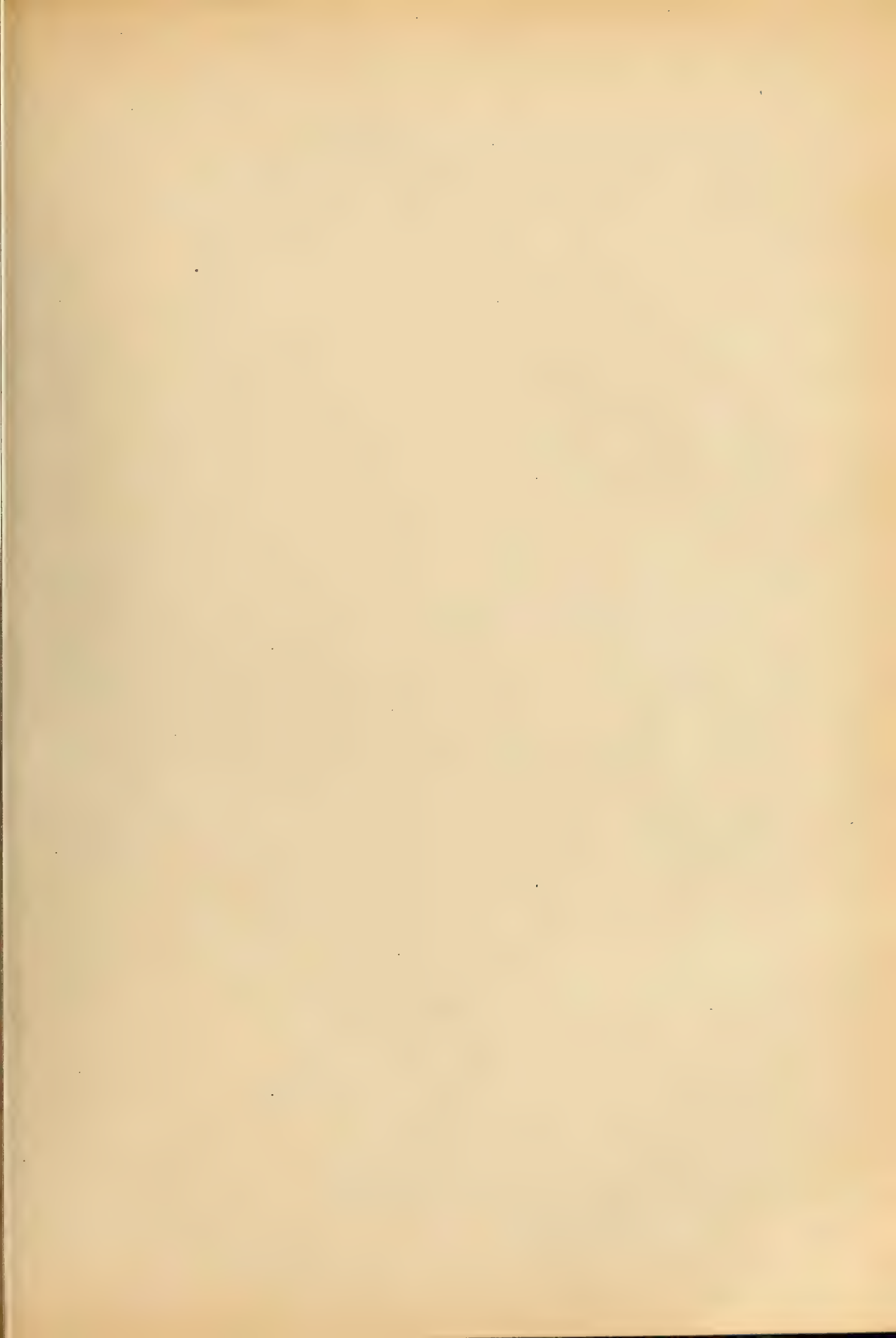
941,011.

Patented Nov. 23, 1909.
 2 SHEETS—SHEET 1.



W. G. Crawford
N. H. Humphrey.

George H. Cheney
 BY *A. Van Buren*
 ATTORNEY



G. K. CHENEY.
 APPARATUS FOR RECORDING SOUND.
 APPLICATION FILED DEC. 12, 1902.

941,011.

Patented Nov. 23, 1909.
 2 SHEETS—SHEET 2.

Fig. 3.

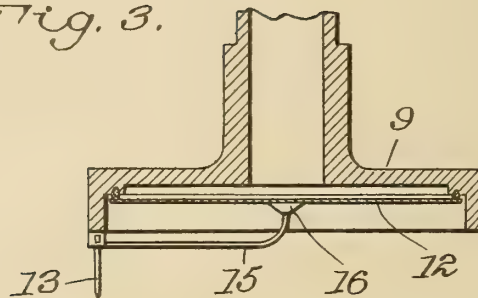


Fig. 6.

Fig. 4.

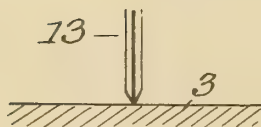


Fig. 5.

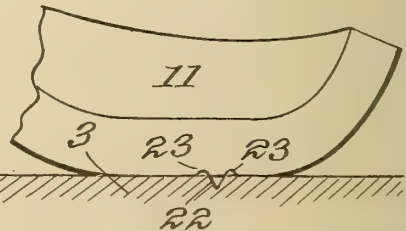
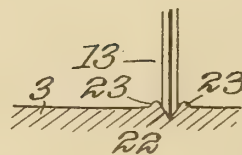
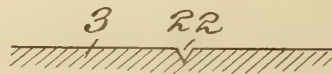


Fig. 7.



WITNESSES:

W. G. Crawford
J. H. Humphrey

INVENTOR

George K. Cheney

BY

A. Van Hook

ATTORNEY

UNITED STATES PATENT OFFICE.

GEORGE K. CHENEY, OF NEW YORK, N. Y., ASSIGNOR, BY MESNE ASSIGNMENTS, TO
VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW JERSEY.

APPARATUS FOR RECORDING SOUND.

941,011.

Specification of Letters Patent.

Patented Nov. 23, 1909.

Application filed December 12, 1902. Serial No. 134,915.

To all whom it may concern:

Be it known that I, GEORGE K. CHENEY, a citizen of the United States of America, and a resident of the borough of Manhattan, city, county, and State of New York, have invented certain new and useful Improvements in Apparatus for Recording Sound, of which the following is a specification.

My invention relates in general to the recording of vocal and other sounds and more specifically consists of an improved apparatus for producing an exact record of sharp, clean outline, in a suitable tablet from which the sound may be reproduced, said record being in the shape of a sinuous line of even depth.

Heretofore, it has been common in the art to make a sinuous line representing sound waves on a photographic material, or in a film upon the surface of a metal plate and then by chemical action to form a corresponding line in a resisting tablet, and the method has also been practiced of cutting or engraving such a line in a tablet of suitable nature, the tool cutting out the material in the shape of chips or shavings. It has been suggested that these methods are objectionable, however, to a more or less extent in that the final record grooves may have certain roughnesses and irregularities which might result from the methods of their formation. My invention is designed to overcome these suggested difficulties by dispensing both with chemical action and any cutting action of the recording tool itself, substituting therefor a dividing and pressing or ironing action of the tool.

The preferred form of apparatus embodying my invention is illustrated in the accompanying drawings in which:

Figure 1 is a perspective view of a record making apparatus. Fig. 2 is a side elevation and partial section of the recording apparatus shown in its relation to the recording tablet. Fig. 3 is a detail sectional view on line 3-3 of Fig. 2. Fig. 4 is an enlarged detail front view of the recording tool point. Fig. 5 is a similar enlarged detail showing said tool in operation, and the shape of the furrow formed thereby in the record tablet. Fig. 6 is an enlarged detail view of the paring knife in action removing

the raised edges of the furrow, and Fig. 7 is an enlarged detail cross section showing the completed groove.

Referring to the drawings, the apparatus comprises a base 1 mounted upon a table 2, by means of a vertical shaft (not shown) permitting rotation. On this table is carried the record tablet 3, of any suitable material. A brake 4 is provided for stopping rotation of the table and tablet when desired. A screw shaft 5 feeds the bed plate 6, which supports the recorder and the paring knife, which separately and in combination constitute the main features of novelty of my invention.

A switch 7 is provided for throwing the screw 5 into and out of engagement with the slide 6 by means of mechanism not shown. An adjustable arm 8 supported from the slide 6 carries a sound box 9, a horn 10 and a paring knife 11. The sound box 9, has the usual diaphragm 12, the vibrations of which are communicated to my improved recording tool 13. This tool is formed integrally with a torsional spring mounted in sockets 14, 14, on the sound box, and has a bell crank arm 15 which is attached by wax 16 to the center of the diaphragm 12 (see Fig. 3). The tool 13 has a backward inclination of approximately 45 degrees to the surface of the record tablet 3, *i. e.* in the direction of travel of the adjacent surface of said tablet, which direction of travel is indicated by the arrow in Fig. 2. This tool has a V-shaped point and front edge. The paring knife 11, is clamped in the holder 17, which is mounted on the piece 18 by means of two trunnion screws one of which is shown at 19 in Fig. 2. The piece 18 is adjustable in all directions, being supported from the arm 8, by means of the various connections shown in Fig. 1, but which need not be here described, as they constitute no part of the invention herein claimed. The holder 17 has a counter-weight 20 adjustable on an arm 21, so that it may be nearly balanced on the trunnion screws as a center. It will be seen that the axis of the pivot or trunnion bearing of the knife holder is approximately at right angles to the line of travel of the record tablet and the knife having considerable overhang beyond said bearing, it will have suf

ficient drag upon the surface of the tablet as the same passes under it to pare off any portions of the material which project up beyond the normal plane of the surface of said tablet, while on the other hand said knife will not bite into the surface of the tablet itself for the reason that any such action would produce an immediate resistance sufficient to turn the holder upon its trunnion and lift the knife out of such deeper engagement with the tablet proper.

The operation of my invention is as follows: A record tablet of suitable material being provided and the mechanism set in motion, the tablet rotating in the direction of the arrow in Fig. 2, sound waves are projected into the horn by declamation, singing, playing of musical instruments, or in any other manner. The parts are so adjusted that the point of the recording tool sinks into the record tablet, as indicated in Fig. 5, and the paring knife 11 barely touches the plane surface of the record tablet, as indicated in Fig. 6. The sound vibrations cause movements of the recording tool so that it irons or scores a sinuous line of even depth in the tablet as the latter advances. On account of the backward rake or inclination of the recording tool, as shown in Fig. 2, said tool does not cut or gouge out a quantity of material in the tablet as the same passes by it, but on the contrary presses said material downward and to either side in the same manner as the advancing prow of a ship acts on the water through which it is passing. This forces the material of the tablet to either side, ironing out a groove 22 therein, with a slightly raised bur or ridges 23, 23, on either side, as shown in Fig. 5. The paring knife being adjusted as before described, cuts off these ridges leaving the surface of the tablet smooth with the sinuous record groove plowed or ironed therein, as shown in Fig. 7. The sound record so produced may be reproduced direct or copies may be made therefrom by any of the well known duplicating methods such as electrotyping and stamping.

The main advantage of my invention is the ironing action of the recording tool which forms a record groove with smooth walls, the surfaces of which have been packed and ironed down by the tool, making the material adjacent to these surfaces denser and harder than it was before being acted upon by the recording tool.

It is evident of course that various changes might be made in the details of operation above described without departing from the spirit and scope of my invention. The paring down of the bur or ridges might be done as a separate operation or dispensed with altogether. Other forms of recording

tool might be employed so long as the necessary backward inclination is retained to give the scoring and ironing action described and to avoid any cutting or paring action of the tool. These and similar modifications, however, would still leave the process within the boundaries of my invention.

Having, therefore, described my invention, what I claim as new and desire to protect by Letters Patent, is:

1. In a sound recording apparatus, the combination with a record, of a recording tool having an end provided with plane converging surfaces and adapted to displace the material of the record both laterally and upwardly in forming the record groove.

2. In a sound recording apparatus, the combination with a record, of a recording tool having an end terminating in lateral inclined surfaces, said surfaces being in the rear of the stock of the tool in relation to the movement of the record.

3. In a sound recording apparatus, the combination with a record, of a record tool having an impressing end which is V-shaped in cross section transversely to the direction of motion of the record material, said V-shaped end being adapted to gradually enter the record material in contradistinction to scraping or cutting said material.

4. In a sound recording apparatus, the combination with a record, of a recording tool having an impressing end which is V-shaped in cross section transversely to the direction of the motion of the record material, said V-shaped end portion forming an edge and laterally inclined sides adapted to impress a V-shaped groove in said material.

5. In a sound recording apparatus, the combination of a recording tool having an end terminating in lateral deflecting surfaces and a second tool for removing the material displaced by said recording tool.

6. In a sound recording apparatus, a combination of a recording tool having an end terminating in lateral inclined surfaces and a cutting tool for removing the material displaced by the recording tool.

7. In a sound recording apparatus, the combination of a recording tool having an end terminating in a transverse V-shaped impressing edge and a cutting tool adjacent said recording tool and adapted to remove the material displaced by the latter.

8. In a sound recording apparatus, the combination of a recording tool having an end adapted to drag in the rear of the stock of the tool, said end terminating in a transversely V-shaped impressing edge and a cutting tool adapted to remove the material displaced by the recording tool.

9. In a sound recording apparatus, the

combination with a record, of a recording tool mounted in such a manner and having its rearward extremity of such a configuration that the same will extend in the same direction as that of the movement of the record and will iron or impress, in contradistinction to gouging, cutting or scraping, in the record, a sinuous groove.

10. In a sound recording apparatus, the combination with a record, of a reproducing tool mounted to rock relative to the surface of the record and having an ironing extremity disposed in such a direction that the regular movement of the record will cause the said extremity to drag on the surface thereof in such a manner as to form a sinuous groove therein.

11. In a sound recorder, the combination with a recording tool, of a cutting tool for removing the material displaced by said recording tool.

12. In a sound recorder, the combination with a record, of a recording tool, and a cutting tool for removing the material displaced by said recording tool, said cutting tool being yieldingly mounted to swing over the record, the path of the cutting edge being tangent to the face of the record.

13. In a sound recorder, the combination with a record, of a recording tool, and a second tool moving in unison with said recording tool over the face of the record to reduce the upwardly displaced edges of the groove, formed by the recording tool, to the normal plane of the record.

14. In a sound recorder, the combination with a record, of a recording tool having record engaging surfaces inclined rearwardly, downwardly and outwardly with respect to the record to the full, transverse sectional contour of the groove.

15. In a sound recorder, the combination with a record, of a recording tool, having a record engaging portion inclined from the front rearwardly, downwardly and outwardly to the full, transverse sectional contour of the groove to compress the material of the record upon the sides of the groove and to iron the same, the material at the edge of the groove being displaced upwardly above the normal face of the record, and a second tool moving in unison with said recording tool over the face of the record to reduce the upwardly displaced edges of the groove to the normal plane of the record.

16. In a sound recorder, the combination with a record, of a recording tool having a record engaging portion inclined from the front rearwardly and downwardly, the front portion of said tool engaging the record being substantially triangular in cross section, whereby the material at the sides of the groove will be compressed and ironed, none

of said material being removed from the record by said tool.

17. In a sound recorder, the combination with a record of a recording tool, having a record engaging portion inclined from the front rearwardly and downwardly, the front portion of said tool engaging the record being substantially triangular in cross section, whereby the material at the sides of the groove will be compressed and ironed, none of said material being removed from the record by said tool, the edges of said groove being displaced upwardly from the normal surface of said record and a second tool following said first mentioned tool to remove the edges of said groove displaced above the normal face of the record.

18. In a sound recorder or reproducer, the combination with a sound box, of a record, and a stylus comprising a bell crank lever, one end thereof being phonetically connected to the diaphragm of the sound box and the other end thereof extending rearwardly and obliquely to the record and constituting the record engaging point, and a mounting for said stylus comprising a torsional spring forming the axis of oscillation of said stylus.

19. In a sound recorder or reproducer, the combination with a sound box, of a record, and a stylus comprising a bell crank lever, one end thereof being phonetically connected to the diaphragm of the sound box and the other end thereof extending rearwardly and obliquely to the record and constituting the record engaging point, and a mounting for said stylus comprising a torsional spring forming the axis of oscillation of said stylus, said spring being rigidly secured to said bell crank intermediate the ends of said spring, and the ends of said spring being rigidly secured to the sound box casing.

20. In a sound recorder or reproducer, the combination with a sound box, of a record, and a stylus having front surfaces inclined rearwardly of the record forming a record engaging point which is V shaped in cross section.

21. In a sound recorder, the combination with a recording tool, of a yieldingly mounted cutting tool for removing the material displaced by said recording tool.

22. In a sound recorder, the combination with a rotary record support, of means movable laterally in respect to said support for compressing undulations corresponding to sound waves in a record tablet carried by said support.

23. In a sound recorder, the combination with a movable record, of a stylus having a record ironing point mounted adjacent the record, to oscillate laterally with respect thereto, said stylus being inclined toward

the record in the direction of motion of the adjacent surface thereof.

24. In a sound recorder, or reproducer, the combination with a record support of a
5 stylus having an ironing extremity mounted to oscillate with respect to said support for engaging a record.

25. In a sound recorder or reproducer, the combination with a record support of a

stylus having an ironing extremity mounted 10
to oscillate laterally with respect to said support.

Signed at New York, N. Y., this 25th day
of November, 1902.

GEORGE K. CHENEY.

Witnesses:

W. H. PUMPHREY,

M. G. CRAWFORD.

C. S. WICKES.
 APPARATUS FOR MAKING SOUND RECORDS FOR TALKING MACHINES.
 APPLICATION FILED JAN. 29, 1908.

941,291.

Patented Nov. 23, 1909.
 2 SHEETS—SHEET 1.

Fig. 1.

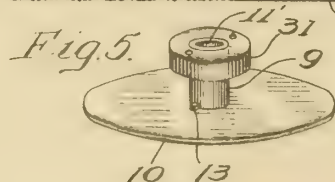
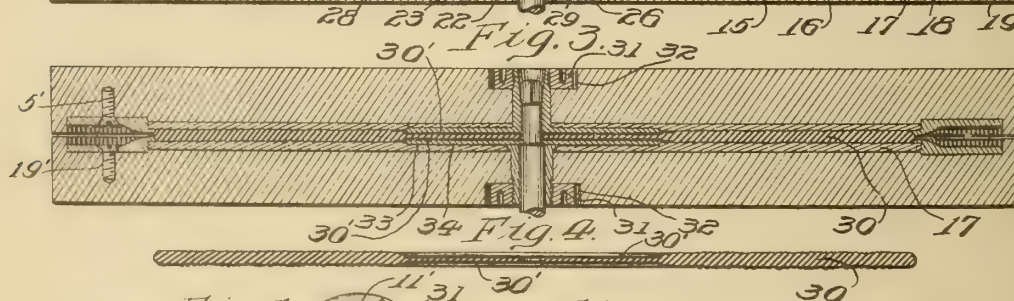
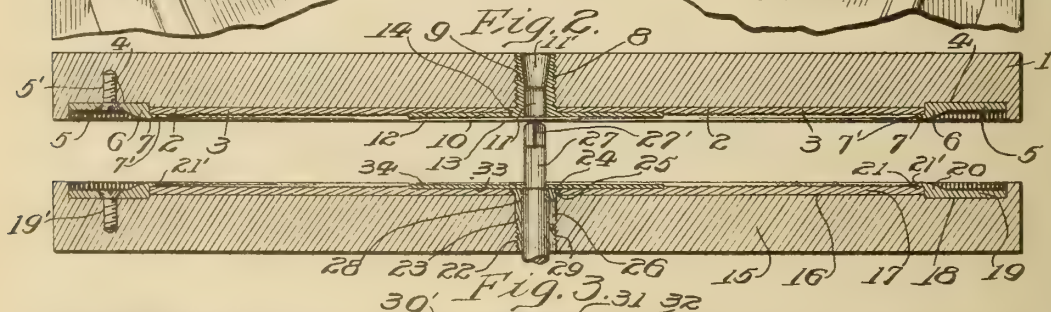
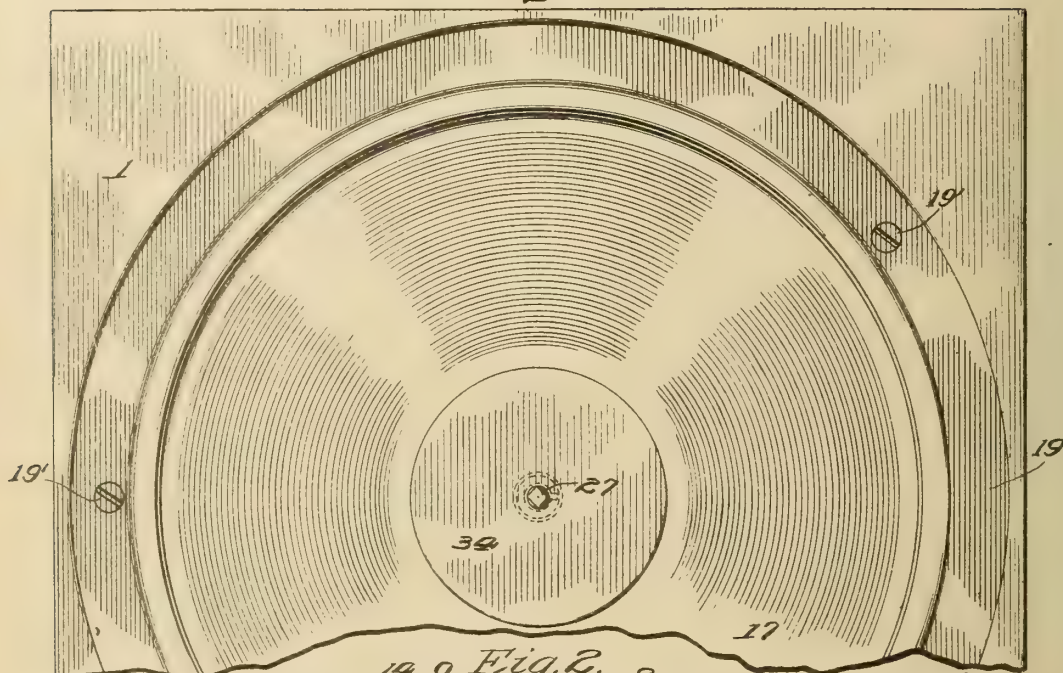


Fig. 6.



INVENTOR
 Clarence S. Wickes.

WITNESSES
 J. G. Hartmann.
 Alex. S. Moulton

BY

H. M. Bell.

ATTORNEY

C. S. WICKES.
 APPARATUS FOR MAKING SOUND RECORDS FOR TALKING MACHINES.
 APPLICATION FILED JAN. 29, 1908.

941,291.

Patented Nov. 23, 1909.

2 SHEETS—SHEET 2.

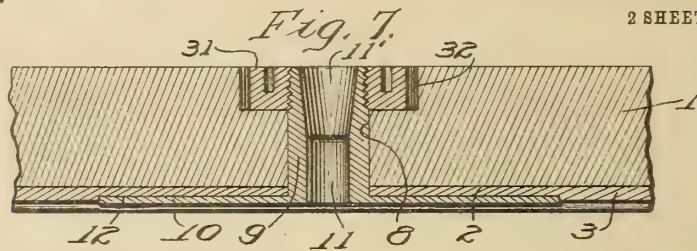


Fig. 8.

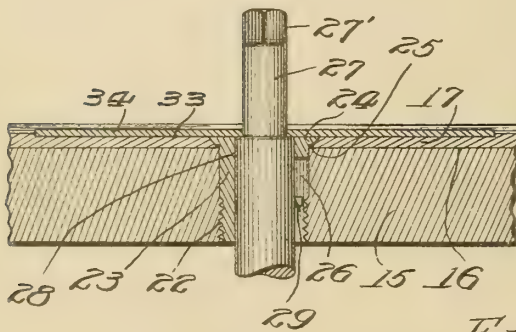


Fig. 9.

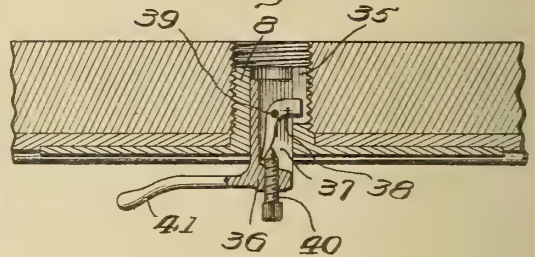


Fig. 10.

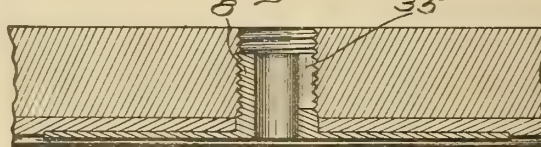


Fig. 11.

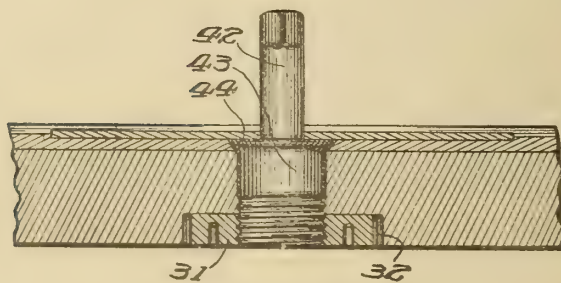
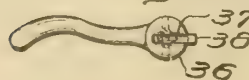


Fig. 12.



WITNESSES
W. J. Hartman
Alexander J. Moulton

BY

INVENTOR
Clarence S. Wickes.

1 Stone

ATTORNEY

UNITED STATES PATENT OFFICE.

CLARENCE S. WICKES, OF CAMDEN, NEW JERSEY, ASSIGNOR TO VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW JERSEY.

APPARATUS FOR MAKING SOUND-RECORDS FOR TALKING-MACHINES.

941,291.

Specification of Letters Patent.

Patented Nov. 23, 1909.

Application filed January 29, 1908. Serial No. 413,237.

To all whom it may concern:

Be it known that I, CLARENCE S. WICKES, a citizen of the United States, and a resident of the city of Camden, State of New Jersey, have invented certain new and useful Improvements in Apparatus for Making Sound-Records for Talking-Machines, of which the following is a full, clear, and complete disclosure.

My invention relates to sound records for talking machines, and especially to the manufacture of double faced records and to the apparatus for pressing the same from a mass of plastic material.

The objects of my invention are to provide means for pressing double faced records of such construction that a true and faithful record of the character above referred to may be easily and rapidly made; to make a mold which will simultaneously press sound records into both sides of the finished record, and at the same time impress labels into both sides of the records; to provide a device in which the record formed therein will have its greatest diameter in a plane between its faces in order to reduce the liability of the record becoming chipped or otherwise mutilated in the later finishing or handling of the same; to unite the labels to the record in such a manner as to form no seam or mark on the record other than those which are desired; to make the various parts of the device replaceable, adjustable and of simple construction; to make a pressing mold which can be readily adapted to different kinds of presses now in use; to facilitate the removal of the finished record from the pressing device, and to secure or fasten to the mold or pressing plate the matrices from which the sound records are pressed in the mold; and to provide other improvements as will appear hereinafter.

In the drawings forming a part of this application, in which the same part is designated by the same reference character throughout the several views, Figure 1 is a plan view of the lower half of the pressing mold; Fig. 2 is a sectional view showing the disposition and relation of the parts; Fig. 3 is a view similar to Fig. 2 with the record in position as pressed between the parts of the

mold and showing a modified manner of securing the matrix to the mold; Fig. 4 is a sectional view of the finished record; Fig. 5 is a detailed perspective view of one form of upper plate for depressing the label into the record; Fig. 6 is a similar view of the lower plate for depressing the label on the other side of the record; Fig. 7 is a detailed view showing the upper plate shown in Fig. 5 in position in the mold with the matrix clamped to the pressing plate; Fig. 8 is an enlarged view of a portion of Fig. 2; Fig. 9 illustrates one manner of securing a label-depressing plate to either the upper or the lower pressing plate; Fig. 10 the plate so secured with the securing means removed; Fig. 11 shows a modified form of the lower plate and the label-depressing plate and Fig. 12 is a plan view of a part of the structure illustrated in Fig. 9.

1 is an upper pressing plate, one side of which is provided with a shallow seat 2 of the size of the matrix 3, and 5 indicates a ring or member for forming the edge of the record, and this ring is of the same diameter as the channel 4 within which it is seated. The inner edge of said ring is thickened as at 6 to form a lip or shoulder 7 which engages the outer edge of the surface of the matrix 3.

In the form of my device illustrated in Fig. 2, the pressing plate 1 is provided with a central opening 8 which is screw threaded and within which is threaded a sleeve 9, having integral therewith at one end thereof a label depressing disk or plate 10. The sleeve 9 is also provided with a central aperture 11, the outer end of which 11' is of a larger diameter tapering inwardly to the diameter of the opening 11. The matrix 3 is preferably provided with a slightly depressed central portion 12, the diameter of which is the same as the diameter of the plate 10, so that the said plate 10 fits snugly within the said depression and rests upon the bottom of the same. The sleeve or bushing 9 is also provided with a key 13 adapted to engage a notch or keyway 14 in said matrix 3.

The lower pressing plate 15 is similarly provided with a depressed seat 16 for the

matrix 17 and with a circular channel 18 surrounding said seat. Within said channel is fitted a ring or edge forming member 19 having its inner edge thickened as at 20 to form an overhanging lip or shoulder 21 resting upon the outer surface of the matrix around the edge thereof. The upper ring 5 and if desired the lower ring 19, may be secured to their respective pressing plates by screws 5'—19', or in any other convenient manner. I also provide the lower plate 15 with the threaded opening 22 within which is fitted the threaded sleeve 23, having a tapering head 24, which head fits within a corresponding recess or hole 25 in the lower matrix 17. The sleeve 23 is slotted or split as at 26 longitudinally of the same so that a centering pin 27 fitted within the opening 28 of said sleeve may be turned to tighten the sleeve and with it the matrix 17 up against the lower pressing plate. By turning the pin 27 the sleeve 23 is also turned by the engagement of a pin or key 29, sliding within the said slot 26.

I preferably bevel off, outwardly, from the face of the matrix, the inner edges 7' and 21' of the thickened lips 7 and 21 of the rings 6 and 20, respectively, so that the inner edges of said lip, forming the inner edges of said rings, will coöperate when in operative position to form a groove to limit the spreading of the record. The record, which is formed between them, will have a smaller diameter on the sides or faces thereof than it has between the planes of its faces; that is to say, so that the greatest diameter of the record lies in a plane between its faces. The record so formed between the matrices will, therefore, have a rounded or beveled or similar shaped edge, and the liability of chipping or breaking the edge of the record, either in removing it from the mold, or in removing the fin which is formed between the thickened lips, or in the later handling of the records, is greatly reduced.

In Fig. 3, the record 30 is shown between the plates which have been pressed together but the bushings of both the upper and lower plates, instead of being threaded directly into said plates, are threaded at their outer ends only and are secured to the plates by nuts 31 seated in depressions 32 at the centers of said plates.

The lower matrix 17 is also provided with a central depression 33 within which fits the label depressing plate 34. Both the plates 10 and 34 are thicker than the depth of the recesses in the matrices into which they are fitted so that they project slightly above the surface of the matrix.

In the form of my device illustrated in Fig. 2, the label depressing plate may be readily screwed to the pressing plate 1 by turning the matrix 3, which by reason of the keyed connection between the sleeve and the matrix gives a considerable leverage on the bushing 9. In said figure and Fig. 8, the lower matrix may be screwed down hard upon the lower pressing plate by applying a wrench to the squared outer end 27' of the centering pin 27.

In Figs. 3 and 7, the matrices may be drawn against their respective pressing plates by applying a wrench to the nuts 31.

In Figs. 9 and 10, the bushing 8 is slotted as at 35 and I may provide a special means for turning the bushings and securing them into the pressing plate, the said device consisting of a pin 36 slotted as at 37 to receive a bell crank lever 38 pivoted on a pin 39 within said slot. The horizontal arm of said bell crank lever is adapted to be swung into and out of the slot 37, in said bushings, the lower end of said bell crank lever being acted upon by the conical end of a screw 40, threaded into the lower end of said pin. As the screw 40 is withdrawn from the end of said pin, the lower end of the bell crank lever will swing outwardly and the horizontal end inwardly while the reverse of said motions will be effected by screwing the said screw 40 inwardly. To tighten the bushing the pin 36 is placed in the central aperture of the bushing and then the screw 40 forced in so as to throw the upper end of the bell crank lever into the slot 35. Then by turning the pin by means of the handle 41, the bushing may be screwed hard into the pressing plate. It is obvious that this means for tightening the label-depressing plate down against the matrix may be used with equal facility in connection with the form of bushing illustrated in Fig. 2.

In Fig. 11, the centering pin 42 is made integral with a stud 43 provided with a head 43' for holding the matrix down against the pressing plate.

In operating my device, a label is first put over the centering pin 27 with its face against the label depressing plate 34, and a sheet or mass of plastic material put on the lower matrix 17. Another label with its face turned upwardly is then put around the pin 27 and the upper plate 1 and the matrix 3 assembled in the manner shown in Figs. 2 and 3 is slipped over the end of the pin 28. The whole is then put between the plates of a suitable press and subjected to a comparatively high pressure; whereupon the matrices from the top and bottom of the mold and the rings the sides of the mold and the sounds recorded in the matrices are impressed into both sides of the record; the labels are also depressed into and secured to the opposite sides of the record, and the edges of the record are molded or formed by the rings 5 and 19. I preferably make the label-depressing plates 10 and 34 slightly

smaller than the label 30' so that no seam will appear on the face of the finished record, the label completely covering the ledge formed by the depressing plates in the record. All the excess of material is squeezed out between the thickened lips 6 and 20 of the rings, and any excess of material which may be forced by the pin 28 up into the upper bushing 9 is readily removed through the hole 11—11' the tapering of the upper end of the hole providing a sufficient clearance to prevent the clogging of the same.

It will be observed in making records in the manner above described that the parting of the mold is in the middle of the finished record rather than at one edge thereof, and the fin thus formed on the record will provide an easy and safe way of removing the finished record from the mold, since any suitable tool may be pressed against the said fin, after the upper pressing plate has been removed, and the record pried from the mold.

I do not desire, however, to be limited in this respect, since the lower label-depressing plate may be used to remove the finished record from the mold. This is accomplished by making the pin 28 slidable in the bushing and providing it with a shoulder 33' abutting against the lower edge of the lower depressing plate. After the upper pressing plate with its matrix has been removed, by sliding or forcing the pin inwardly, the label-depressing plate will be lifted from the matrix, and will carry with it the newly formed record. This form of device is especially applicable to record molding machines, in which the record is automatically ejected from the mold.

It will be observed that my apparatus as formed is exceedingly simple, that the various parts may be readily replaced or re-assembled to set the device up for pressing different records; that in using my device it is very easy to separate the records from the molds and that the liability of the record to warp in removing it from the molds is greatly reduced.

In automatic machines for pressing records, the lower pin will extend through the lower plate, as indicated in Figs. 2, 3 and 8 and act as an ejector for the finished records, while in plain hydraulic presses the said pin will not extend below the bottom surface of the lower plate, as illustrated in Fig. 11.

While I have described clearly one way in which my invention may be carried out, I do not wish to be construed as limited to the exact construction set forth, as it is obvious that other means or apparatus than that shown are fully contemplated by me, so long as they are within the terms of the appended claims.

Having thus fully described my invention,

what I claim and desire to protect by Letters Patent of the United States is:

1. In an apparatus for forming records, a pressing plate, a matrix having a depression, a label-depressing plate seated in said depression and projecting above the surface of the matrix.

2. In an apparatus for forming records, a pressing plate, a matrix having a circular depression, a label-depressing plate fitted within said depression, and projecting above the surface of the matrix.

3. In an apparatus for forming records, a pressing plate, a matrix having a central depression in the face thereof, a label-depressing plate fitted in said depression and projecting above the surface of the matrix, and an edge forming member overlying the outer edge of said matrix.

4. In an apparatus for forming records, a pressing plate, a matrix seated on said plate, and an edge forming member surrounding said matrix and overlying the outer edge of said matrix.

5. In an apparatus for forming records, a pressing plate, a matrix having a depression, a label-depressing plate fitted within said depression and projecting above the surface of said matrix, and means to secure said label-depressing plate to said pressing plate.

6. In an apparatus for forming records, a pressing plate, a matrix and means to secure said matrix to said plate by a rotation of said matrix.

7. In an apparatus for forming records, a pressing plate, a matrix, and means to secure said matrix to said plate, said means providing projecting means for depressing a label into the record.

8. In an apparatus for forming records, a pressing plate, a matrix, and label-depressing means for securing said matrix to said pressing plate.

9. In an apparatus for forming records, a pair of pressing plates, a matrix seated on each plate, label-depressing means for each matrix, and an edge forming member removably seated on one of said pressing plates.

10. In an apparatus for forming records, a pair of pressing plates, a matrix seated on each plate, label-depressing means for each matrix, and an edge forming member seated on one of said pressing plates and overlapping the other edge of the matrix.

11. In an apparatus for forming records, a pair of pressing plates, a matrix seated on each plate, label-depressing means for each matrix, and rings seated on said pressing plates and overlapping the outer edges of said matrix.

12. In an apparatus for forming records, a pair of pressing plates, a matrix secured to each plate, each matrix being provided

with a central depressed portion, label-depressing means overlying each matrix and fitting within said depression and projecting each above the said matrix, and a concentric ring overlapping the outer edges of each matrix.

13. In an apparatus for forming records, a pair of pressing plates, a matrix secured to each plate, and label-depressing means overlying the central portion of each matrix.

14. In an apparatus for forming records, pressing plates, a matrix having a central depression, and label-depressing means seated in said depression and projecting above the surface thereof, means to secure said label-depressing plate to said presser plate, and means to prevent relative rotation between said matrix and said label depressing plate.

15. In an apparatus for forming records, a pressing plate, a matrix, a bushing to hold said matrix against said plate, a centering pin in said bushing projecting beyond the surface of said matrix and means located around said pin for forcing the finished record away from said matrix.

16. In an apparatus for forming records, a pressing plate, a matrix, a label-depressing plate, and means secured to said depressing plate and passing through said matrix for fastening said depressing plate to said pressing plate.

17. In an apparatus for forming records, a pressing plate, a matrix, a label depressing plate, and a sleeve secured to said depressing plate passing through said matrix and fastened to said pressing plate.

18. In an apparatus for forming records, a matrix having a depressed portion for receiving a label-depressing plate.

19. In an apparatus for forming records, a matrix having a depressed central portion for receiving a label-depressing plate.

20. In an apparatus for forming records, a matrix having a depressed central portion, a label-depressing plate seated in said depressed portion, and means to prevent a relative turning between said plate and said matrix.

21. In an apparatus for forming records, a pair of matrices, an edge-forming member surrounding each matrix and having a thickened portion adjacent each matrix, and means to support each matrix and its edge forming member to press a plastic material between them.

22. In an apparatus for forming records, a pair of matrices, an edge-forming member surrounding each matrix and having a thickened portion adjacent each matrix, means to support each matrix and its ring, and means to align said matrices to press a plastic material between them.

23. In an apparatus for forming records,

a pair of matrices, a ring surrounding each matrix and having a thickened portion provided with a lip, and means for supporting said matrices and rings to press a plastic material between them.

24. In an apparatus for pressing records, a pair of matrices, a pair of edge-forming members one for each matrix surrounding the same and having a portion overhanging the edge of each matrix.

25. In an apparatus for pressing records, a pressing plate, a matrix, a label-depressing plate, a sleeve secured to said depressing plate and threaded into said pressing plate, said sleeve being provided with a key-way, and means engaging said key-way for turning said sleeve to clamp said matrix firmly against said depressing plate.

26. In an apparatus for forming records, the combination with a matrix, of a centering pin carried thereby and freely movable longitudinally for separating the record from the matrix.

27. In an apparatus for forming records, the combination with a matrix, of a label-depressing plate, and means to move said plate away from said matrix to separate the record from said matrix.

28. In an apparatus for forming records, the combination with a matrix, of a plate having a smooth, flat face and movable with respect to said matrix, for depressing a label into the face of the record.

29. In an apparatus for forming records, the combination with a matrix, of a plate having a smooth, flat face and movable with respect to said matrix, for depressing a label into the face of the record to bring the outer surface of the portion of the record acted upon by the plate below the surface of the finished record.

30. In an apparatus for forming records, the combination with a substantially flat matrix, of a smooth flat label depressing plate movable with respect to said matrix, whereby the major portion of a label may be depressed below the surface of the record and the edge of the label over the shoulder formed by the depression of the major portion of the label.

31. In an apparatus for forming records, the combination with a substantially flat matrix, of a plate to depress the major portion of the face of a label larger than said plate below the surface of the face of a record and means to press the record against said matrix to impress the margin of the label into the face of the record with the upper surface of the said margin substantially flush with the outer surface of the said record.

32. In an apparatus for forming sound records, the combination with a matrix, of means cooperating therewith to limit the

spreading of the record and to give the record its greatest diameter in a plane between its faces.

33. In an apparatus for forming sound records, the combination with a matrix, of separable means cooperating with the matrix to limit the spreading of the record and to give the record its greatest diameter in a plane between its faces.

34. In an apparatus for forming sound records, the combination with a matrix, of means for limiting the spreading of the record and for giving the record its greatest diameter in a plane between its faces, said means comprising separable parts, the inner edges of said parts cooperating when in operative position to form a groove.

35. In an apparatus for forming sound records, the combination with a pressure plate for bringing a pressure to bear upon the face of the record, of two separable elements for limiting the spreading of the record, the inner edges of said elements cooperating when said elements are in operative position to form a groove, whereby the record is given its greatest diameter intermediate of its faces.

36. In an apparatus for forming sound records, the combination with a pressure plate for bringing pressure to bear upon the face of the record, a pair of separable rings for limiting the spread of the record, the inner edges of said rings cooperating to form a groove when said elements are in operative position, whereby the record is given its greatest diameter intermediate of its faces.

37. In an apparatus for forming records, the combination with a matrix, of an edge forming member overlying the edge of said matrix.

38. In an apparatus for forming sound records, the combination with a matrix, of an annular edge forming member surrounding said matrix and overlying the outer edge thereof.

39. In an apparatus for forming records, the combination with a pressing plate, of a matrix seated on said plate, and an edge forming member secured to said plate and overlying the outer edge of said matrix.

40. In an apparatus for forming records, the combination with a pressing plate, of a matrix seated on said plate and an annular edge forming member removably secured to said plate and overlying the outer edge of said matrix.

41. In an apparatus for forming a record, the combination with a matrix, of an edge forming member surrounding said matrix and having a thickened portion adjacent the matrix.

42. In an apparatus for forming records, the combination with a matrix, of a ring

surrounding said matrix and having a thickened portion provided with a lip overlying the outer edge of said matrix.

43. In an apparatus for forming records, the combination with a pressing plate, of a matrix seated on said plate and a ring removably secured to said plate and surrounding said matrix, and having a thickened portion provided with a lip overlying the edge of said matrix.

44. In an apparatus for forming records, the combination with a pressing plate, of a matrix, and means to secure said matrix to said plate comprising a sleeve threaded into said plate and provided with a key-way, and means engaging said key-way for turning said sleeve to clamp said matrix against said plate.

45. In an apparatus for forming sound records, the combination with a matrix, of means cooperating therewith to give the record its greatest diameter in a plane between its faces.

46. In an apparatus for forming sound records, the combination with a matrix, of means cooperating with the matrix to give the record its greatest diameter in a plane midway between its faces.

47. In an apparatus for forming sound records, the combination with a matrix, of a support for the matrix and two-part means cooperating with the matrix to give the record its greatest diameter in a plane between its faces, one of said parts being carried by said support.

48. In an apparatus for forming sound records, the combination with two oppositely disposed matrices, of means cooperating with the matrices to form the edge of the record and to give the record its greatest diameter in a plane between its faces.

49. In an apparatus for forming sound records, the combination with two oppositely disposed matrices, of a support for each matrix, and two-part means cooperating with the matrices to form the edge of the record, and to give the record its greatest diameter in a plane between its faces, one of the parts being carried by each support.

50. In an apparatus for forming sound records, the combination with two oppositely disposed matrices, of a support for each matrix and two part means cooperating with the matrices to bevel the opposite sides of the edge of the record whereby the record is given its greatest diameter in a plane substantially midway its faces, one of the parts being carried by each support.

51. In an apparatus for forming sound records, the combination with a pressing plate, of means cooperating therewith to limit the spreading of the record and to give the record its greatest diameter in a plane between its faces.

52. In an apparatus for forming sound records, the combination with a pressing plate, of means coöperating therewith to give the record its greatest diameter in a plane between its faces. 5
53. In an apparatus for forming sound records, the combination with a pressing plate, of means coöperating therewith to level the edges of the record whereby the record is given its greatest diameter in a plane between its faces. 10
54. In an apparatus for forming sound records, the combination with a matrix, of means surrounding said matrix and coöperating therewith to give the record its greatest diameter in a plane between its faces. 15
55. In an apparatus for forming sound records, the combination with a matrix, of means surrounding said matrix and coöperating therewith to give the record its greatest diameter in a plane midway between its faces. 20
56. In an apparatus for forming sound records, the combination with a matrix, of means comprising two annular elements coöperating with the matrix to give the record its greatest diameter in a plane between its faces. 25
57. In an apparatus for forming sound records, the combination with a pair of matrices provided with central openings, of a centering pin in said openings and freely movable longitudinally to separate a record from one of the matrices. 30
58. In an apparatus for forming sound records, the combination with a pair of matrices provided with central openings, of a centering pin projecting through said openings, one of said openings being enlarged at one end for the removal of an excess of record material. 35
59. In an apparatus for forming sound records, the combination with a pair of matrices provided with central openings, of a centering pin projecting through said openings, said pin being freely movable longitudinally to force a record away from one of said matrices. 40
60. In an apparatus for forming sound records, the combination with a matrix, of a centering pin projecting through said matrix and freely movable longitudinally in either direction for removing a record therefrom. 45
61. In an apparatus for forming sound records, the combination with a matrix, of means freely movable longitudinally for separating a record therefrom. 50
62. In an apparatus for forming sound records, the combination with a pressing plate, of a matrix, a sleeve for holding said matrix against said plate, and a centering pin extending through said sleeve and projecting in opposite directions therefrom and movable longitudinally to separate the record from said matrix. 55
63. In an apparatus for forming records, a matrix having a depression, and a label depressing plate seated in said depression. 60
64. In an apparatus for forming records, a matrix having a substantially flat recorded face, and a label depressing plate engaging in said matrix and projecting upon opposite sides of said face. 65
65. In an apparatus for forming records, a matrix having a substantially flat recorded face, and a label depressing plate engaging in said matrix and projecting upon opposite sides of said face and movable with respect to said matrix. 70
66. In an apparatus for forming sound records, a pair of pressing plates, each of said plates being provided with a depressed seat, a matrix upon said seat, and having a circular channel surrounding said seat and an annular edge forming member secured in said channel, and a centering pin projecting from one of said matrices and engaging an aperture provided therefor in the other of said matrices. 75
67. In an apparatus for forming sound records, the combination with a pressing plate, of a matrix, and a sleeve for holding said matrix against said plate. 80
68. In an apparatus for forming sound records, the combination with a pressing plate, of a matrix, a sleeve for holding said matrix against said plate and a centering pin projecting through said sleeve and beyond the face of said matrix. 85
69. In an apparatus for forming sound records, the combination with a pressing plate, of a matrix, a centering pin, and means actuated by the movement of said centering pin for holding said matrix against said pressing plate. 90
70. In an apparatus for forming sound records, the combination with a pressing plate, of a matrix, a centering pin, and means actuated by the rotation of said centering pin for holding said matrix against said pressing plate. 95
71. In an apparatus for forming sound records, the combination with a pressing plate, of a matrix, a centering pin, and means actuated by the rotation of said centering pin for holding said matrix against said pressing plate, said centering pin being freely movable longitudinally to separate a record from said matrix. 100
72. In an apparatus for forming sound records, the combination with a pressing plate, of a matrix, a sleeve for holding said matrix against said plate, and a centering pin in said sleeve, said centering pin being freely movable longitudinally but being held against rotation with respect to said sleeve. 105
73. In an apparatus for forming records, 110

the combination with a pressing plate, of a matrix, a sleeve for securing said matrix to said plate, and a pin movable in said sleeve for separating a record from said matrix.

5 74. In an apparatus for forming records, the combination with a pressing plate, of a matrix, a sleeve concentric with said matrix for securing said matrix to said plate, and a centering pin movable in said sleeve for
10 separating a record from said matrix.

75. In an apparatus for forming records, the combination with a pressing plate, of a

matrix, means for holding said matrix against said plate and means movable independently of said holding means for separating a record from said matrix. 15

In witness whereof, I have hereunto set my hand this 27th day of January, A. D. 1908.

CLARENCE S. WICKES.

Witnesses:

FRANK B. MIDDLETON, Jr.,
SYDNEY I. PRESCOTT.

3 SHEETS—SHEET 1.



G. M. S. sent over
Harry & Ruth

Harry C. Miller
or Grace Pettit

ATTORNEY.

H. C. MILLER.
 COMBINED STAND AND HORN FOR TALKING MACHINES.
 APPLICATION FILED APR. 27, 1909.

Reissued Nov. 23, 1909.

13,044.
 3 SHEETS—SHEET 2.

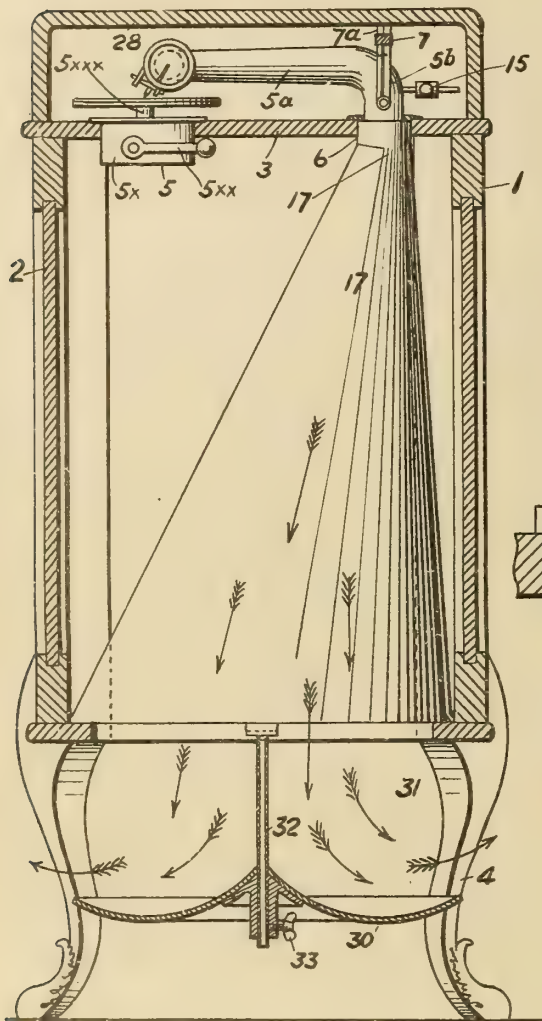


FIG. 4.

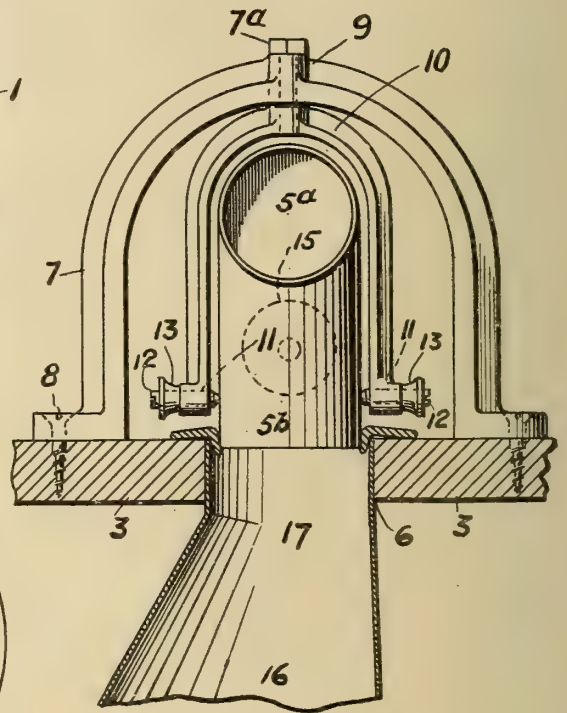


FIG. 3.

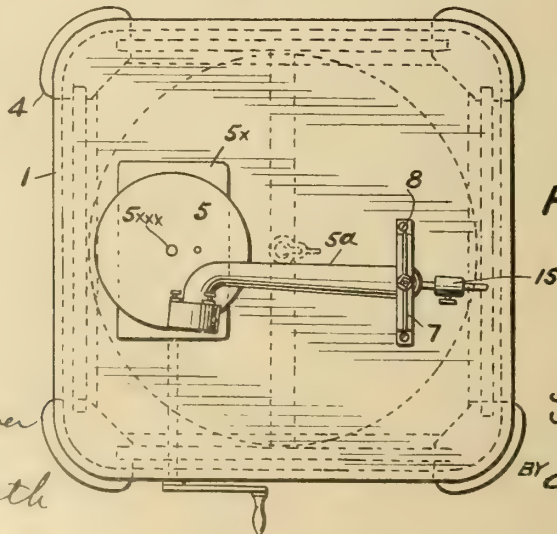


FIG. 5.

WITNESSES:
G. M. Copenhaver
Harry F. Rueth

INVENTOR
Harry C. Miller
 BY *Ernest Pettit*
 ATTORNEY.

H. C. MILLER.
 COMBINED STAND AND HORN FOR TALKING MACHINES.
 APPLICATION FILED APR. 27, 1909.

Reissued Nov. 23, 1909.

13,044.
 3 SHEETS—SHEET 3.

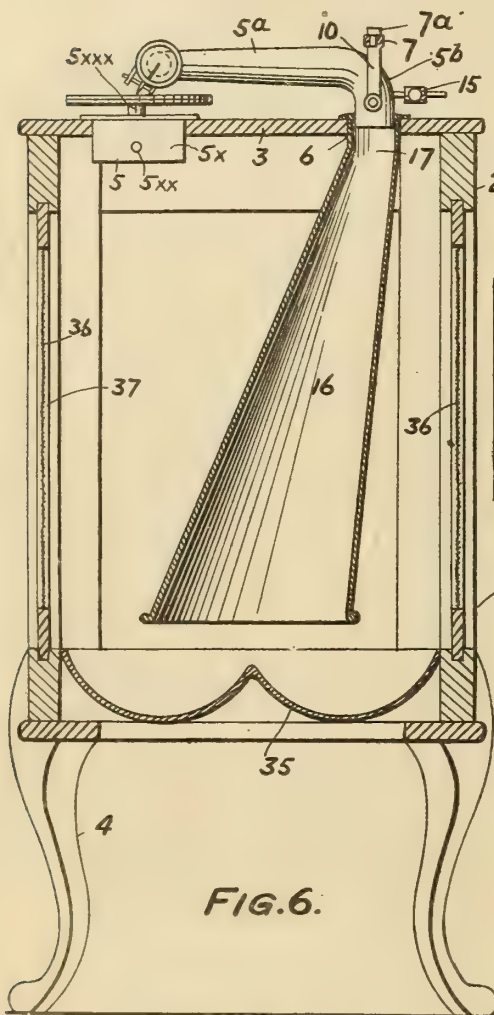


FIG. 6.

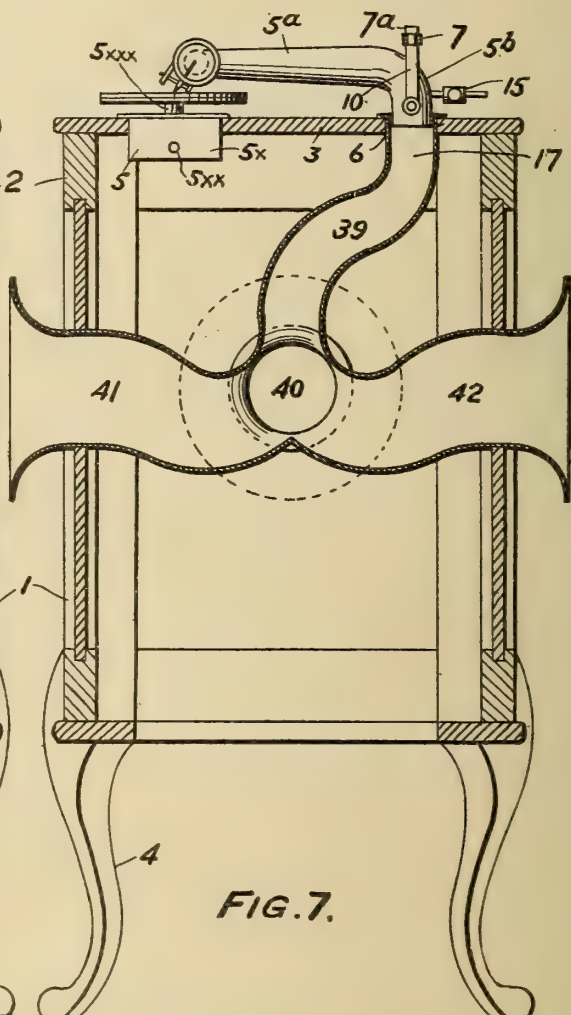


FIG. 7.

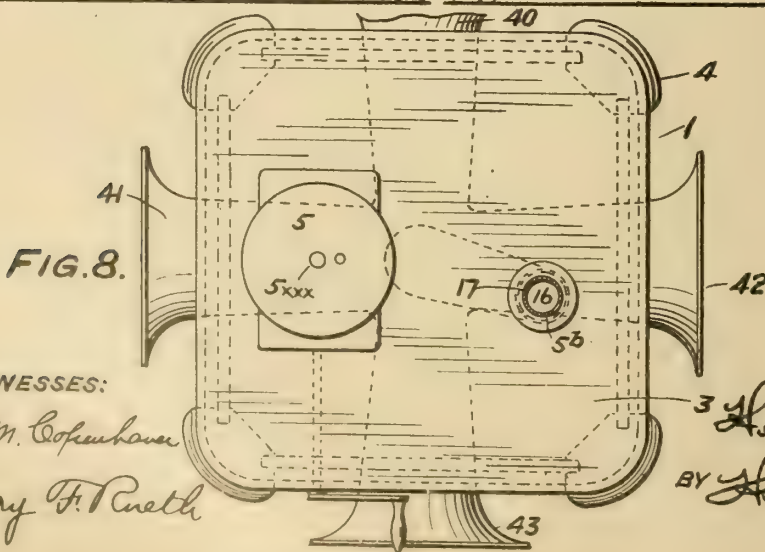


FIG. 8.

WITNESSES:
G. M. Copenhagen
Harry F. Rueth

INVENTOR
Henry C. Miller
 BY *Horace Pettit*
 ATTORNEY.

UNITED STATES PATENT OFFICE.

HENRY C. MILLER, OF WATERFORD, NEW YORK, ASSIGNOR, BY MESNE ASSIGNMENTS, TO VICTOR TALKING MACHINE COMPANY, OF CAMDEN, NEW JERSEY, A CORPORATION OF NEW JERSEY.

COMBINED STAND AND HORN FOR TALKING-MACHINES.

13,044.

Specification of Reissued Letters Patent. Reissued Nov. 23, 1909.

Original No. 793,013, dated June 20, 1905, Serial No. 235,722, filed December 6, 1904. Divided and this application for reissue filed April 27, 1909. Serial No. 492,481.

DIVISION B.

To all whom it may concern:

Be it known that I, HENRY C. MILLER, a citizen of the United States, residing at Waterford, in the county of Saratoga and State of New York, have invented new and useful Improvements in a Combined Stand and Horn for Talking-Machines, of which the following is a specification, this application being a division of another application filed by me June 20, 1907, Serial No. 379,993.

This invention relates to improvements in a combined stand and horn for a talking-machine.

Talking-machines now in use employ a horn extending out from the sound box, which is large, unsightly, and frequently takes up so much room that it is in the way. I have found that it is not essential to extend the horn from the machine and have therefore constructed a cabinet in which the talking-machine is placed and utilize the interior of the cabinet to accommodate a horn, and a deflector to distribute the sound. The object of combining these two elements is to economize space and at the same time provide means for utilizing a large horn without projecting it out from the talking-machine, as practiced with machines of this type now in use.

A further object of this invention is to provide a stationary horn in a cabinet with an adjustable exit that the sound may be directed to an audience at any angle.

Other objects and advantages will be hereinafter referred to and be particularly pointed out in the claims.

In the drawings, Figure 1 is a sectional view of the preferred form of my invention. Fig. 2 is a top plan view with the cover removed. Fig. 3 is a detail transverse vertical section of the means employed for supporting the pipe leading from the talking-machine to the horn and the connection between the pipe and the horn. Fig. 4 is a vertical sectional view of a modified form of my invention. Fig. 5 is a plan view of the same. Fig. 6 is a vertical section of a different modification. Fig. 7 is a similar view of a further modification. Fig. 8 is a plan view of the modification shown in Fig. 7.

The numeral 1 indicates a cabinet com-

posed of sides 2, top or support 3, and legs 4. The top 3 is cut out to receive a talking machine 5, which may be of any well-known type, and connected to the sound-box is a tube 5^a, having the outer end 5^b turned down. The talking machine includes a casing 5^x, extending within the cabinet below the support 3, and includes operating means, parts of which are indicated by the handle 5^{xx}, and the disk post 5^{xxx}. An opening 6 is formed in the top 3 opposite the talking-machine, and straddling the opening is a yoke 7, fastened in place by screws 8, and provided at about its center with a vertical opening 9, the center of said opening being coincident with the center of the opening 6. A smaller yoke 10 is swiveled to the yoke 7 by a bolt 7^a, passing through the opening 9, and at the terminals of the yoke 10 are aligned openings 11 11 to receive pointed screws 12 12, which receive lock nuts 13 13. The points of the screws 12 bind the turned-down end 5^b of the tube 5^a to fasten the latter to the yoke 10. This construction permits the tube to turn horizontally, the screw 7^a being the pivotal connection. A weight 15, is mounted on a rod extending from the tube to counterbalance the tube and the sound box.

16 indicates a horn made conical, its smaller end 17, fitting in the opening 6 and its larger end or mouth extending to the bottom of the cabinet 1. A suitable packing is interposed between the turned-down end 5^b of the tube 5^a and the upper end 17 of the horn. Obviously the purpose of the packing is to prevent the escape of sound at this point.

Connected to the bottom of the cabinet and communicating with the horn is arranged an adjustable flexible sound-deflector 20. The deflector may be secured to the bottom of the cabinet in any suitable manner, but preferably by a spring roller 20^a, and at its front end is a bar 21, having connected to it an arm 22, provided with an opening 23. Adjacent the arm is a bracket 24, fastened to the cabinet and formed with an opening 25. A set screw 26 passes through the openings 23 and 25 to set the mouth of the deflector at a convenient angle. By making the deflector of flexible material

it can be rendered adjustable without the necessity of making joints, &c., which would retard the sound waves.

The spring-roller 20^a is of the usual type and can be used to roll the deflector under the cabinet when not in use.

While I have described one form of means for holding the deflector after it has been adjusted, I desire it to be distinctly understood that it is in no wise intended as a limitation.

28 indicates a cover hinged to the cabinet to shield the talking-machine.

In operation the talking-machine is started and the sound passes through the tube 5^a to the horn 16, thence to the deflector, and out to the atmosphere. The sound striking the deflector is thrown out into the atmosphere in a soft blended tone. The "brassy" sound so prevalent with talking-machine horns is almost entirely removed.

By swiveling the tube at one end, as described, the end of said tube and the horn are always retained in alinement.

In the modification shown in Figs. 4 and 5 the horn 16 and its connection with the talking-machine are the same as in Figs. 1 to 3: but the deflector is made in the form of a concavo-convex disk 30, and the space 21 is formed between the bottom of the horn and the disk for the exit of sound. The disk is formed with a central hole which receives a standard 32, depending from the bottom of the cabinet, the disk being secured to the standard by a set-screw 33, so that the column of sound emitted through the space 31 can be quickly and conveniently controlled.

In the form of my invention shown in Fig. 6 a concavo-convex disk 35 is located inside the cabinet 1, and the sound passes to the atmosphere through opening 36, covered with net or fine gauze 37. In many instances this construction gives decidedly satisfactory results: but by reason of it not having an adjustable deflector the sound cannot be regulated.

From the foregoing it will be seen that I have provided a simple and neat stand for a talking-machine and have also arranged a convenient means for accommodating the horn. Such a construction as before stated, absolutely removes the unsightly and awkward appearance of the horn extending from the talking machine. Furthermore, by providing the adjustable deflector the

range, tone, and volume of sound are under perfect control of the operator.

In Figs. 7 and 8 I have provided the horn 39 with four branches 40, 41, 42 and 43, a branch passing through an opening in each side of the cabinet and forming a deflector. The area of the branch tubes about equals the area of one of the big horns shown in Fig. 1, so that the sound produced is equal in volume to the preferred form.

What I claim is:—

1. In a talking machine, the combination with a record, of a coöperating reproducer, a horizontal stationary amplifier connected with the reproducer, and means for preventing extraneous vibration of the amplifier.

2. In a talking machine, the combination with a record, of a coöperating traveling reproducer, an amplifier connected with the reproducer, and an inclosure below the record within which is horizontally positioned the major portion of the amplifier.

3. In a talking machine, the combination with a record operating in a fixed position of a coöperating traveling reproducer, an amplifier connected with the reproducer and an inclosure supporting the major portion of the amplifier in a fixed horizontal position, and preventing extraneous vibration of said amplifier.

4. In a talking machine, the combination with a record, of a reproducer, means for producing a relative movement of said record and reproducer whereby sound is reproduced, an amplifier connected with the reproducer and shaped to cause travel of the sound waves through two substantially parallel planes, one of said planes lying above the record and the other below, and means for preventing extraneous vibration of the amplifier.

5. In a talking machine, the combination with a record, of a reproducer, means for producing a relative movement of said record and reproducer whereby sound is reproduced, and an amplifier connected with the reproducer and shaped to cause travel of the sound waves through two substantially parallel planes, one of said planes lying above the record and the other below.

In witness whereof I have hereunto set my hand this 23 day of April, A. D. 1909.

HENRY C. MILLER.

Witnesses:

JNO. IMIRIE,

ERNEST A. LIEBERMANN.

H. A. SMITH.
ATTACHMENT FOR PHONOGRAPHS.
APPLICATION FILED JULY 10, 1908.

941,546.

Patented Nov. 30, 1909.
3 SHEETS—SHEET 1.

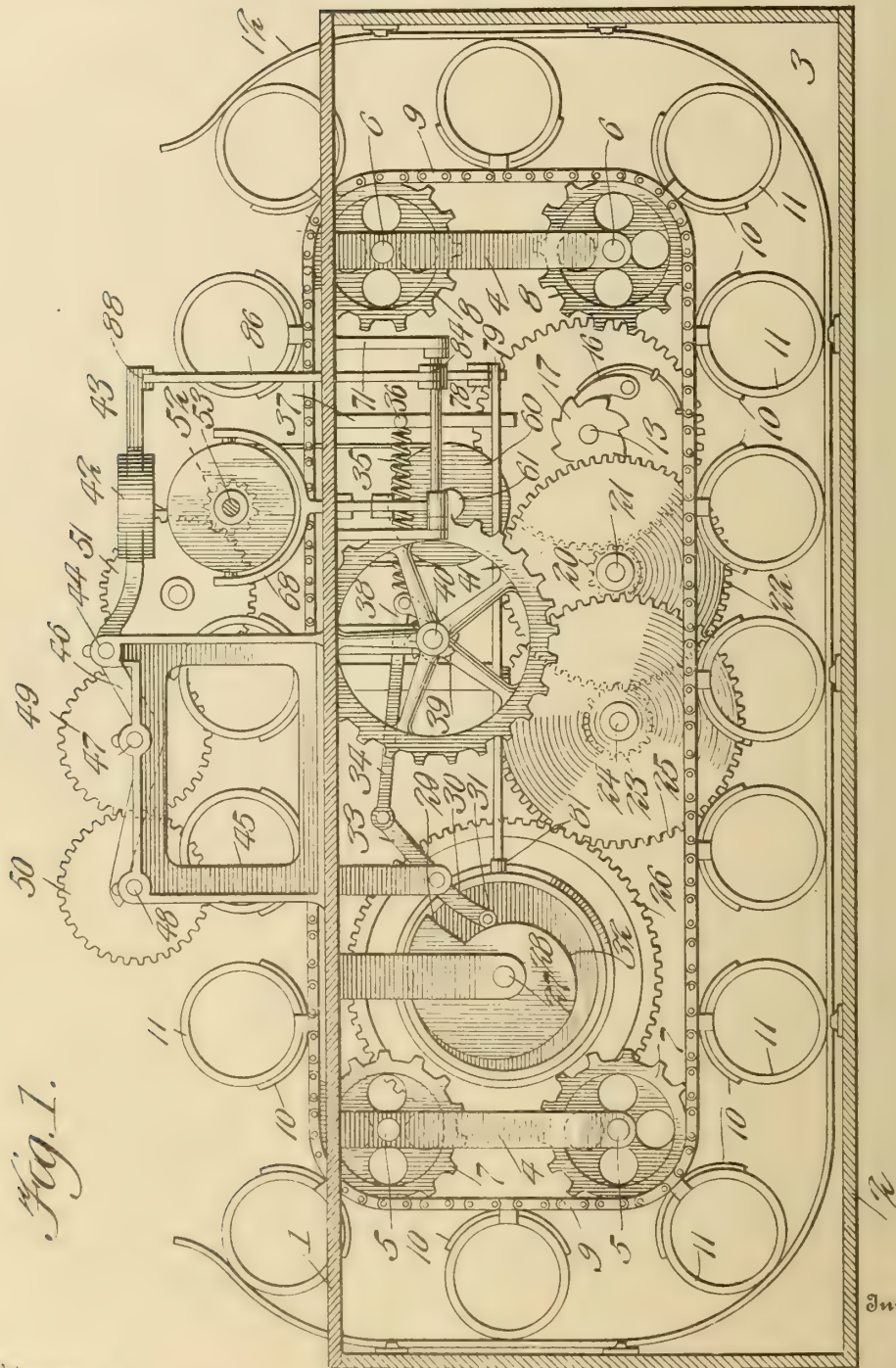


Fig. 1.

Witnesses
H. A. Smith
R. M. Smith.

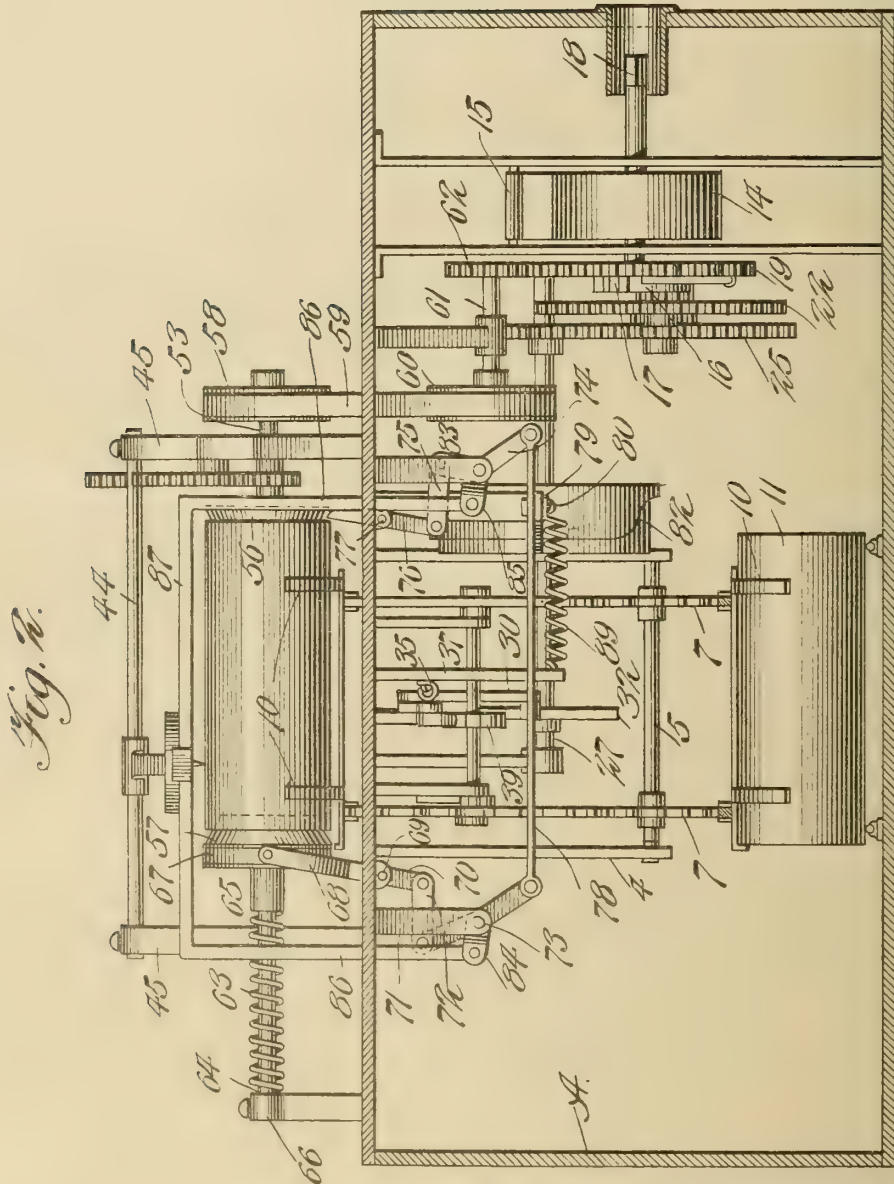
By

Harry A. Smith
Victor J. Evans
Attorney

H. A. SMITH.
ATTACHMENT FOR PHONOGRAPHS.
APPLICATION FILED JULY 10, 1908.

941,546.

Patented Nov. 30, 1909.
3 SHEETS—SHEET 2.



Inventor

Harry A. Smith

Witnesses
H. Ackman.
R. M. Smith.

By

Victor J. Evans

Attorney

500 - 0.0000

• • •

—

— 2 —

H. A. SMITH.
ATTACHMENT FOR PHONOGRAPHS.
APPLICATION FILED JULY 10, 1908.

941,546.

Patented Nov. 30, 1909.

3 SHEETS—SHEET 3.

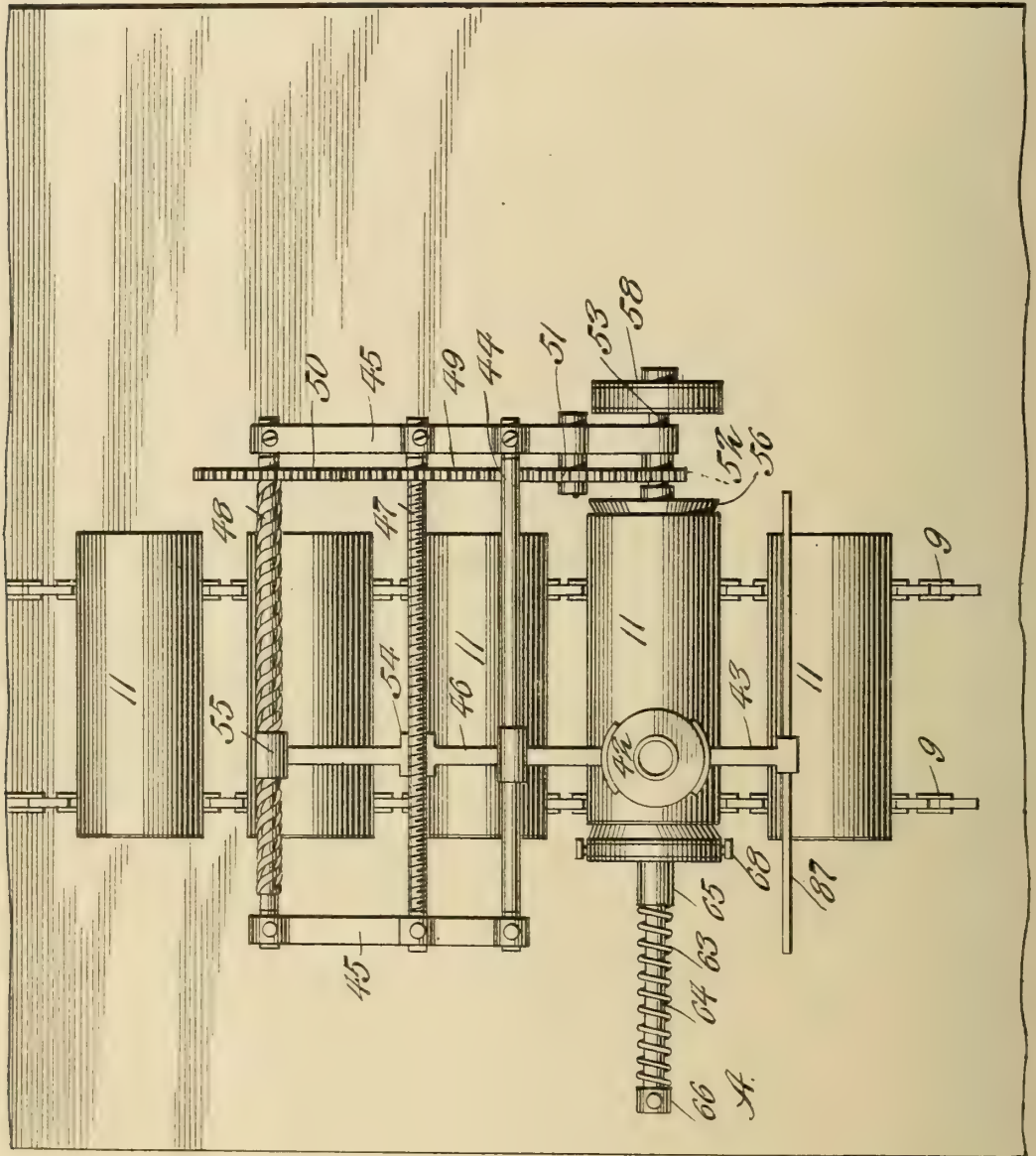


Fig. 3.

Witnesses

Geo. Ackmann.
R. M. Smith.

Inventor

Harry A. Smith

By

Victor J. Evans
Attorney

UNITED STATES PATENT OFFICE.

HARRY A. SMITH, OF COLUMBUS, OHIO.

ATTACHMENT FOR PHONOGRAPHS.

941,546.

Specification of Letters Patent.

Patented Nov. 30, 1909.

Application filed July 10, 1908. Serial No. 442,906.

To all whom it may concern:

Be it known that I, HARRY A. SMITH, a citizen of the United States, residing at Columbus, State of Ohio, have invented new and useful Improvements in Attachments for Phonographs, of which the following is a specification.

This invention relates to phonographs, the object of the invention being to provide mechanism whereby a plurality of records may be advanced to and moved away from the playing or reproducing position and successfully operated in connection with the reproducer, the mechanism being entirely automatic and motion being imparted to the various elements of the mechanism from a single source of power which, in the preferred embodiment of the invention, consists of a spring motor contained within the housing or casing of the apparatus and forming a part of the mechanism as a whole, the power generated by such motor being utilized to intermittently advance the records to and from the reproducing position, and also to clutch and release the records successively and also to actuate the reproducer back and forth during its operative or outgoing movement and its return or inactive movement.

With the above and other objects in view, the nature of which will more fully appear as the description proceeds, the invention consists in the novel construction, combination and arrangement of parts as herein fully described, illustrated and claimed.

In the accompanying drawings:—Figure 1 is a vertical longitudinal section taken through the casing of the machine, showing the record-moving mechanism in elevation, the view being taken looking toward the ends of the cylindrical records. Fig. 2 is a vertical section taken at right angles to Fig. 1. Fig. 3 is a plan view of the record reproducing portion of the apparatus.

The machine comprises a box or casing A in which a portion of the mechanism is contained and upon which the remainder of the mechanism is mounted, said casing being shown as comprising a top 1 and bottom 2 and sides and ends 3.

Mounted in suitable hangers 4 connected to the under side of the top 1 are two sets of sprocket wheel shafts 5 and 6 each of which carries a pair of sprocket wheels 7 and 8 around which run parallel chains or record carriers 9, said chains being pro-

vided at opposite points and at suitable intervals with arcuate holders 10 upon which the cylindrical records 11 are mounted as shown in Figs. 1, 2 and 3. As shown in Fig. 1 the chains together with the records carried thereby travel in a rectangular path within a guard 12, the ends of which extend upward through openings in the top of the casing as shown, which casing is also provided with apertures in the top thereof through which the records 11 pass during the movement of the carrying chains.

The mechanism for actuating the chains and imparting intermittent movement thereto and to the records carried thereby comprises an initial spring operated arbor 13 to which is connected a suitable power spring 14 one end of which is connected to a part of the frame as shown at 15. The winding mechanism comprises pawl and ratchet members 16 and 17 respectively for holding the shaft after the spring is wound thereon, and said arbor is squared as shown at 18 to receive a suitable winding key like the key of any ordinary clock mechanism. On the same arbor 13 there is mounted a spur gear wheel 19 which meshes with a pinion 20 on a counter-shaft 21 on which is another large spur gear wheel 22 which meshes with a pinion 23 on another counter-shaft 24 having also fast thereon another spur gear wheel 25. The wheel 25 meshes with a spur gear wheel 26 fast on a cam shaft 27, all of said shafts being mounted in suitable bearings within the casing A.

Fast on the cam shaft 27 is a cam 28 having an abrupt radial shoulder 29 as shown in Fig. 1 while coöperating with said cam is one arm 30 of a cam lever, which arm 30 is preferably provided with a roller 31 at the end thereof which operates against the peripheral face 32 of the cam 28. The other arm 33 of the cam lever has pivotally connected thereto a reciprocatory bar 34 to the opposite end of which is connected a contractile spring 35 the opposite end of which is connected at 36 to a post 37 extending downward from the top 1 of the casing. The bar 34 carries a pawl 38 which engages the teeth of a ratchet wheel 39 which is fast on a centrally arranged chain actuating shaft 40, said shaft being provided with oppositely arranged sprocket wheels 41 which engage at their upper sides with the sprocket chains 9 hereinabove referred to. By means of the mechanism above described, it will

be observed that in each complete revolution of the wheel 26, an intermittent throw or movement is imparted to the shaft 40 and the sprocket wheels 41 and consequently to the chains 9. In this way, the records are moved forward with a step-by-step motion, the records being carried successively to the point of reproduction and then successively moved onward beyond said point. The position or point of reproduction is shown best in Fig. 1 in which 42 designates the reproducer beneath which one of the records is located while in the reproducing position.

The reproducer 42 is carried by a pivoted arm 43 which is fulcrumed on a rod 44 supported by a frame 45 extending from the top 1 of the casing upward as shown in Fig. 1. The reproducing arm 43 is provided with a lever extension 46 which extends under a feed screw 47 and over a return screw 48, the screws 47 and 48 being geared together by means of spur gear wheels 49 and 50 while the gear 49 meshes with and is driven by a similar gear wheel 51 which is in turn driven by a pinion 52 on the shaft 53 of one of the friction cones hereinafter described by which the record is revolved. By reference to Fig. 3 it will be observed that the one feed screw 47 has comparatively fine threads while the return screw 48 has comparatively coarse threads for effecting a comparatively quick return of the reproducer and it will also be observed that the lever 46 is provided with a nut segment 54 which engages the under side of the feed screw 47 and is also provided with another nut segment 55 which engages the upper side of the return screw 48. The lever 46 is so bent that one side only of the nut segments thereof may be thrown into engagement with their respective screws at a time. When the reproducer 42 is moved downward to its operative position, the nut segment 54 is raised into threaded engagement with the screw 47 and as the latter revolves the feed screw is fed lengthwise of the revolving record. When the reproducer 42 is elevated out of contact with the record, the nut segment 54 is moved downward out of operative engagement with the feed screw 47 while the nut segment 55 is moved downward into the operative relation to the return screw 48, the latter operating to return the reproducer 42 quickly to its initial or starting point.

Rotary motion is imparted to an individual record upon reaching the point of operation by means of a pair of oppositely arranged cones 56 and 57, 56 designating the driving cone and 57 the tension cone. The cones 56 and 57 are in the nature of friction clutches being of a size adapting them to enter the opposite ends of the hollow cylindrical record as best illustrated in Figs. 2 and 3, the driving cone 56 being mounted on

the shaft 53 which is provided with a pulley 58 receiving a driving belt 59 from another pulley 60 mounted fast on a shaft 61 on which is also fast a spur gear wheel 62 which is driven by the spur gear wheel 19 above described thus providing for imparting rotary motion to the record.

The tension cone or clutch member 57 is pressed yieldingly toward the path of movement of the records by means of an expansion spring 63 which is coiled around the shaft or spindle 64 on which the cone 57 is mounted, said spring being interposed between the hub 65 of the cone and the bearing 66 in which the outer end of said spindle 64 is journaled. The outer periphery of the cone 57 is grooved to receive a band 68 which fits loosely therein and is engaged by the arms of a shipping fork 68 which is fulcrumed at 69 on the casing, said fork being provided with a lever arm or extension 70 to which is connected one end of a link 71 the opposite end of which is connected to one arm of a clutch lever 72 fulcrumed intermediate its ends at 73 on a bracket hanger extending downward from the top of the casing as clearly shown in Fig. 2. At the side opposite the lever 72 there is arranged another lever 74 which is connected by a link 75 with a record throw-off lever 76 which is fulcrumed intermediate its ends at 77 on the top of the casing, the upper end of said lever being adapted to strike against the adjacent end of the record and move said record out of engagement with the driving cone 56. The levers 72 and 74 are connected by a rod 78 whereby both of said levers are simultaneously operated. The rod 78 is shifted by means of a cam lever 79 which is fulcrumed intermediate its ends by means of a pivot or bolt 80 connected with a bracket arm extending down from the top of the casing. One end of said cam lever carries a roller 81 which works against a lateral cam face 82 on the cam 28 above referred to, said cam being provided with a peripheral cam face 32 and a lateral cam face 82. The lever 79 is acted upon by the cam face 82, which operates to shift the connecting rod lengthwise and thereby simultaneously rock the levers 72 and 74, one of said levers as previously stated, controlling the tension cone or clutch 57 while the other lever controls the device by which the record is moved out of engagement with the driving cone 56.

The levers 72 and 74 are mounted on rock shafts 73 and 83 and said shafts are provided with short crank arms 84 and 85 which connect with a three-sided lifting frame comprising the two-sided bars 86 and the top horizontally connecting bar 87 which forms a guide rail upon which the free end of the reproducer bar 43 travels, said arm being grooved or notched as shown at 88 to

fit said rail as shown in Fig. 1 when the reproducer is in operative contact with the underlying record. 89 designates a retracting spring which operates to hold the roller 5 81 in engagement with the lateral face 82 of the cam, said spring having one end connected to the cam lever 79 and the opposite end connected to the post 37.

10 After winding up the spring 14 and setting the mechanism in motion, the power of said spring is utilized to drive the main gear 26 and thereby impart motion to the cam 28 which in turn operates the bar 34 and pawl 38 to impart intermittent rotary move- 15 ment to the sprocket chains 9 which carry the records. When a record reaches the reproducing position, the power of the spring 14 is shifted to the mechanism for clutching the record which is then engaged by the cone 20 above referred to and elevated slightly off the holders after which it is taken up and driven by the cone 56 to which motion is imparted by the main spring 14. The power of the spring is also utilized to drive the feed 25 and return screws 47 and 48 with the effect that the reproducer 42 is moved back and forth across the periphery of the cylindrical record in a manner similar to phonographs now in common use. Thus the entire mechanism of the machine hereinabove described 30 is automatic, requiring no attention on the part of the operator after primarily winding the spring 14, the machine operating to

successively move the records into reproducing position and after causing the re- 35 producer to traverse the surface of the record, to move said records again successively away from the reproducing position. The machine may be constructed in various sizes capable of holding any desired number of 40 records which may be reproduced successively in the manner hereinabove set forth.

I claim:—

A phonographic machine comprising a casing, a reproducer, means for propelling 45 said reproducer along the surface of the record, an endless series of records, means for imparting intermittent movement to said series of records operating to successively arrest the movement of the records in repro- 50 ducing position, a reproducer feed screw, a return screw, and a lever forming an extension of the reproducer arm, and being fulcrumed between the reproducer and said screws, said lever extending to one side of 55 the feed screw and to the opposite side of the return screw and being provided with nut segments respectively adapted to engage said screw one at a time.

In testimony whereof I affix my signature 60 in presence of two witnesses.

HARRY A. SMITH.

Witnesses:

JOHN M. LIEB,
WAYNE G. WRIGHT.

F. L. CAPPS.
 PRODUCTION OF DOUBLE FACED SOUND RECORDS.
 APPLICATION FILED AUG. 6, 1908.

941,975.

Patented Nov. 30, 1909.

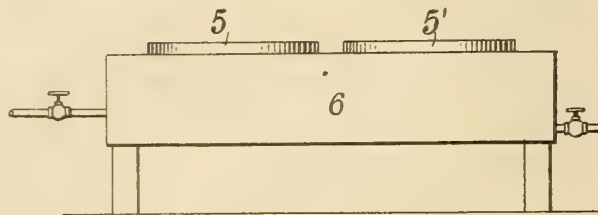


Fig. 1

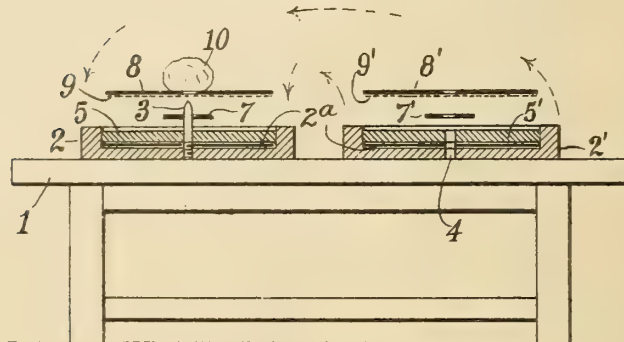


Fig. 2

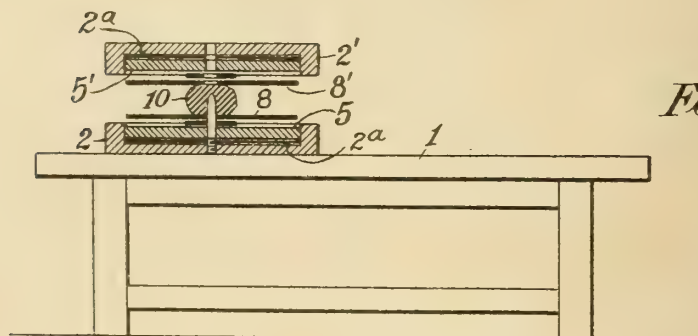


Fig. 3

Fig. 4

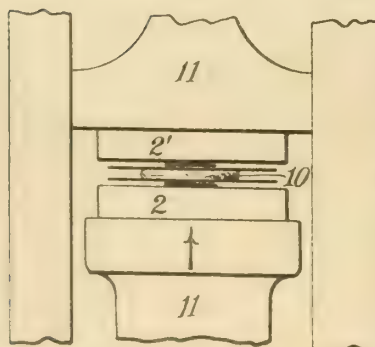
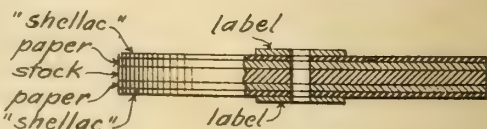


Fig. 5



Witnesses:
Frederick A. Holton
J. D. Messer

Frank L. Capps Inventor
 By *his Attorneys*
Mauro, Cameron Lewis & Massie

UNITED STATES PATENT OFFICE.

FRANK L. CAPPS, OF BRIDGEPORT, CONNECTICUT, ASSIGNOR TO AMERICAN GRAPHOPHONE COMPANY, OF BRIDGEPORT, CONNECTICUT, A CORPORATION OF WEST VIRGINIA.

PRODUCTION OF DOUBLE-FACED SOUND-RECORDS.

941,975.

Specification of Letters Patent.

Patented Nov. 30, 1909.

Application filed August 6, 1908. Serial No. 447,281.

To all whom it may concern:

Be it known that I, FRANK L. CAPPS, a citizen of the United States of America, and a resident of Bridgeport, Connecticut, have invented a new and useful Improvement in the Production of Double-Faced Sound-Records, which improvement is fully set forth in the following specification.

My invention relates to the production of the so-called "double-faced" disk sound-records, which are commonly of the zigzag variety, although they may also be of the vertically-undulating type.

The invention will be best understood by reference to the annexed drawings that indicate successive steps in producing the record.

In the drawings, Figure 1 represents a steam-table on which matrices are being heated; Fig. 2 represents a work-table, containing (shown in cross-section) two dies, and certain other articles indicated as not quite in final position; Fig. 3 is a similar view of the same at a later stage; Fig. 4 represents the dies with their contents in position in a press; and Fig. 5 is a cross-section of the final article. The thickness of the parts constituting the record is greatly exaggerated in all the drawings, for the sake of clearness.

Upon the work-table 1 are placed two dies 2—2', each recessed to receive a matrix. From the center of the recess in one die (as 2) rises a stud or pin 3, while the other die (as 2') has a corresponding central hole 4 that will receive the stud 3 when the dies are brought face to face. A paper disk 2^a is placed in the bottom of each recess. Two centrally-apertured matrices 5—5' are heated upon the steam-table 6, and each placed face uppermost upon the paper sheets 2^a in the recess of each die. In practice, the dies do not require any application of heat other than may be imparted to them (through the paper) by reason of the heated matrices. A centrally-apertured label (indicated at 7—7') is laid face downward upon the center of each matrix. Upon each label and matrix is placed a centrally-apertured sheet 8 (8'), the prepared surface being next to the matrix. This sheet is of the exact diameter of the record to be made, and is preferably of ordinary paper. Its surfacing consists preferably of a high-grade composition

(e. g., one containing shellac) which has been sprinkled upon the same and made secure by the application of heat (for instance, as described in the Macdonald & Capps patent, No. 870,569, Nov. 12, 1907). This surfacing is indicated at 9—9'. Next a lump or mass 10, of any convenient thermo-plastic record-material, such as the so-called "stock" and preferably of cheap or inferior quality, is placed on top of one of the dies (as 8). Then the workman reverses the other die 2' (with its sheet 2^a, matrix 5', label 7', and sheet 8'), taking pains to hold in place the contents of the recess. This reversing is indicated by the dotted line and the arrow in Fig. 2. When the two dies with their contents are brought face to face, with the lump 10 of thermo-plastic material between, the whole is inserted between the plates 11 of a suitable press (Fig. 4), and pressure applied in the usual manner. In about one minute the matrices and record will become sufficiently chilled to permit taking them out. The fact that the dies were not independently heated, and are therefore comparatively cool, facilitates this.

The resulting article (indicated by Fig. 5) is a disk consisting of a flat central layer of the material 10, having on each side thereof the sheet 8 (8') with its surfacing 9 (9') of high-grade material, in each of which surfaces appears an impressed sound-record, while centrally of each surface is the label. The two matrices are returned to the steam-table to be re-heated for further use, while the dies are meantime recovering their normal temperature (or they may be artificially cooled from time to time, if found desirable).

While I have described the process as comprising the heating beforehand of the matrices (without independently heating the dies), yet the dies also may be slightly warmed, in which case the paper disks 2^a may be dispensed with. While I have likewise referred to the surfacing 9—9' as of high-grade material and the central mass 10 as of low-grade material, yet this relative distinction in quality is not material to the invention, though, of course, it would be preferable to employ cheaper material for the body or central portion of the record.

Having thus described my invention, I claim:

1. The herein described process of pro

5 ducing double-faced records, which consists, first, in heating two record-matrices; second, placing each matrix face upward within the recess of a die; third, placing a label face
 10 downward upon the center of each matrix; fourth, placing face downward upon each matrix and label a sheet having a surface of high-grade record-material; fifth, placing upon the back of one of said sheets a mass of thermo-plastic material; sixth, reversing the
 15 same upon top of the thermo-plastic material; and, seventh, inserting the parts thus assembled into a press and applying pressure.

2. The herein-described process of producing double-faced sound-records, which consists of applying face downward upon each of two heated record-matrices a label
 20 and a sheet surfaced with high-grade material, next bringing the same together with a mass of inferior record-material interposed, and finally applying pressure.

3. The herein-described process of producing double-faced records, which consists of applying face downward upon each of two record-matrices a label and a sheet surfaced with high-grade material, next bringing the same together with a mass of inferior record-material interposed, and subjecting the same to heat and pressure.

4. The process of producing double-faced sound-records, which consists of sprinkling upon disks of paper a dry finely powdered
 35 material rich in shellac, causing the same to adhere to the paper by heat, heating record-matrices, placing the same face uppermost in suitable dies, placing a label face downward centrally upon each of two matrices so
 40 positioned, then placing face downward upon each of the same the coated paper disk aforesaid, then placing upon the back of one of said disks a mass of thermo-plastic

material, inverting the other of said dies with its contents and placing it upon top
 45 of said mass, and finally subjecting the parts so assembled to pressure.

5. The process of producing double-faced sound-records, which consists, first, in placing a sheet of paper within the recess of
 50 each of two cold dies; second, heating two record-matrices; third, placing each of them face upward upon the sheet of paper within the said recess; fourth, placing a label face downward upon the center of each matrix;
 55 fifth, placing face downward upon each matrix a label and a sheet having a surface of high-grade record-material; sixth, placing upon the back of one of said sheets a mass of thermo-plastic material; seventh,
 60 reversing the other die with its contents and locating the same upon top of the said thermo-plastic material; and, eighth, inserting the parts thus assembled into a press and applying pressure.

6. The process of producing double-faced sound-records, which consists of, first, placing a sheet of paper within the recess of
 70 each of two cold dies; second, placing therein in the order indicated a matrix face upward, a label face downward, and a properly-surfaced sheet face downward; third, placing on one of said sheets a mass of thermo-plastic material, and reversing the other die
 75 with its contents and locating the same upon said mass; and, fourth, subjecting the things between the two matrices to heat and pressure.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

FRANK L. CAPPS.

Witnesses:

C. A. L. MASSIE,
 RALPH L. SCOTT.



T. H. MACDONALD.
 PHONIC APPARATUS.
 APPLICATION FILED DEC. 21, 1904.

942,089.

Patented Dec. 7, 1909.
 2 SHEETS—SHEET 1.

Fig. 1.

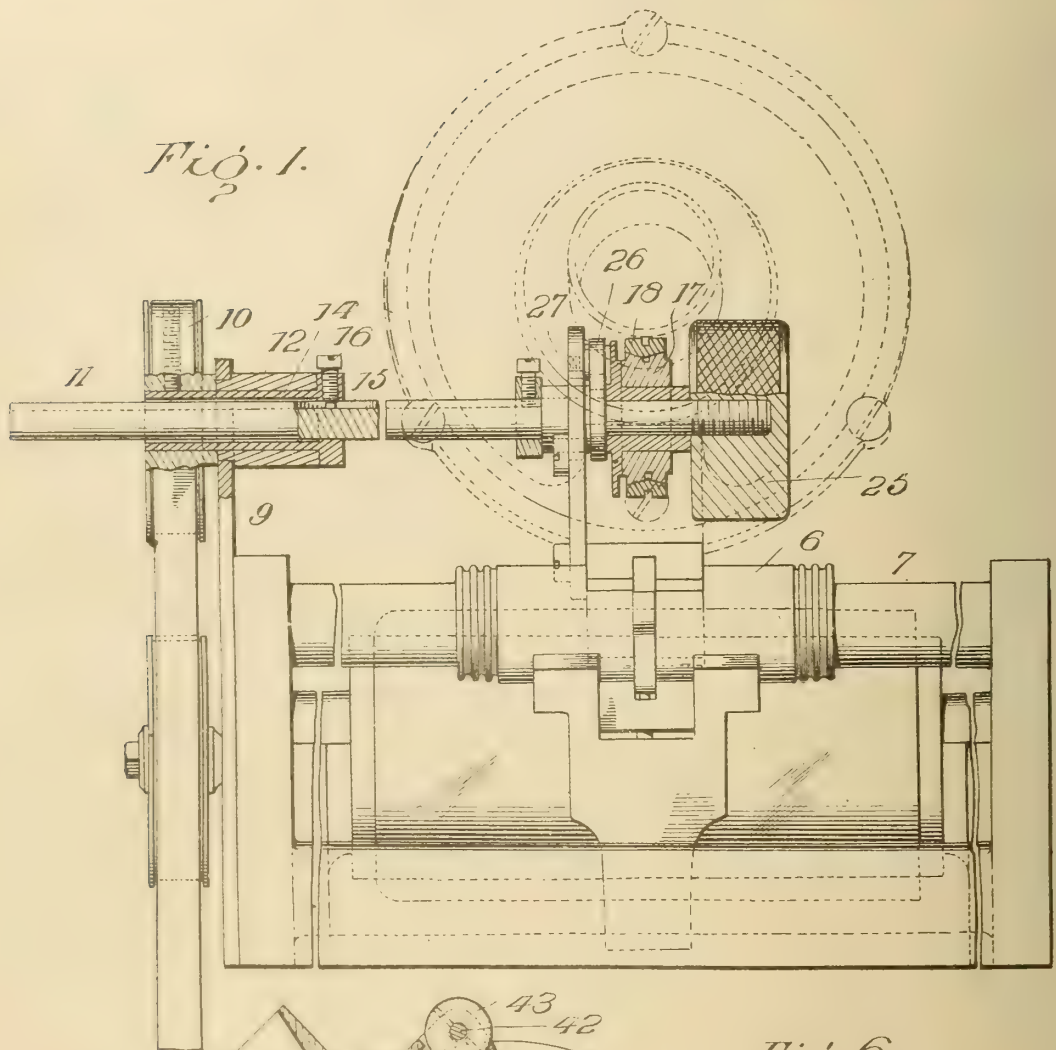


Fig. 4.

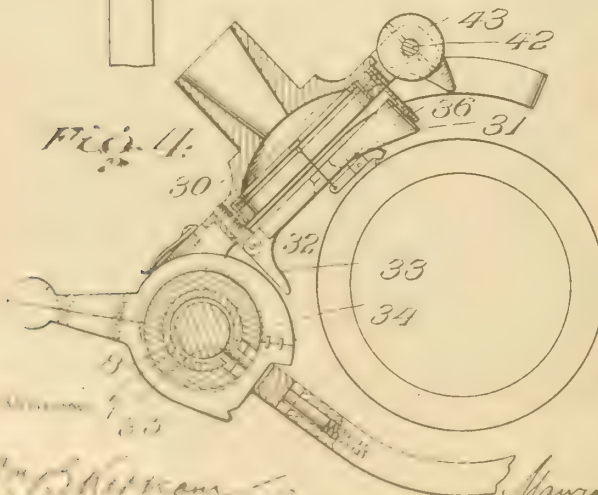
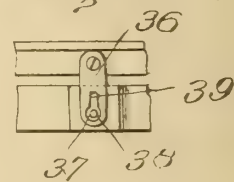


Fig. 6.



Inventor

Thomas H. Macdonald,
 by

Wm. B. Sherman
 Master R. Thompson.

Morris, Cameron, Lewis & Mason.
 Attorney's.



T. H. MACDONALD.
 PHONIC APPARATUS.
 APPLICATION FILED DEC. 21, 1904.

942,089.

Patented Dec. 7, 1909.

2 SHEETS—SHEET 2.

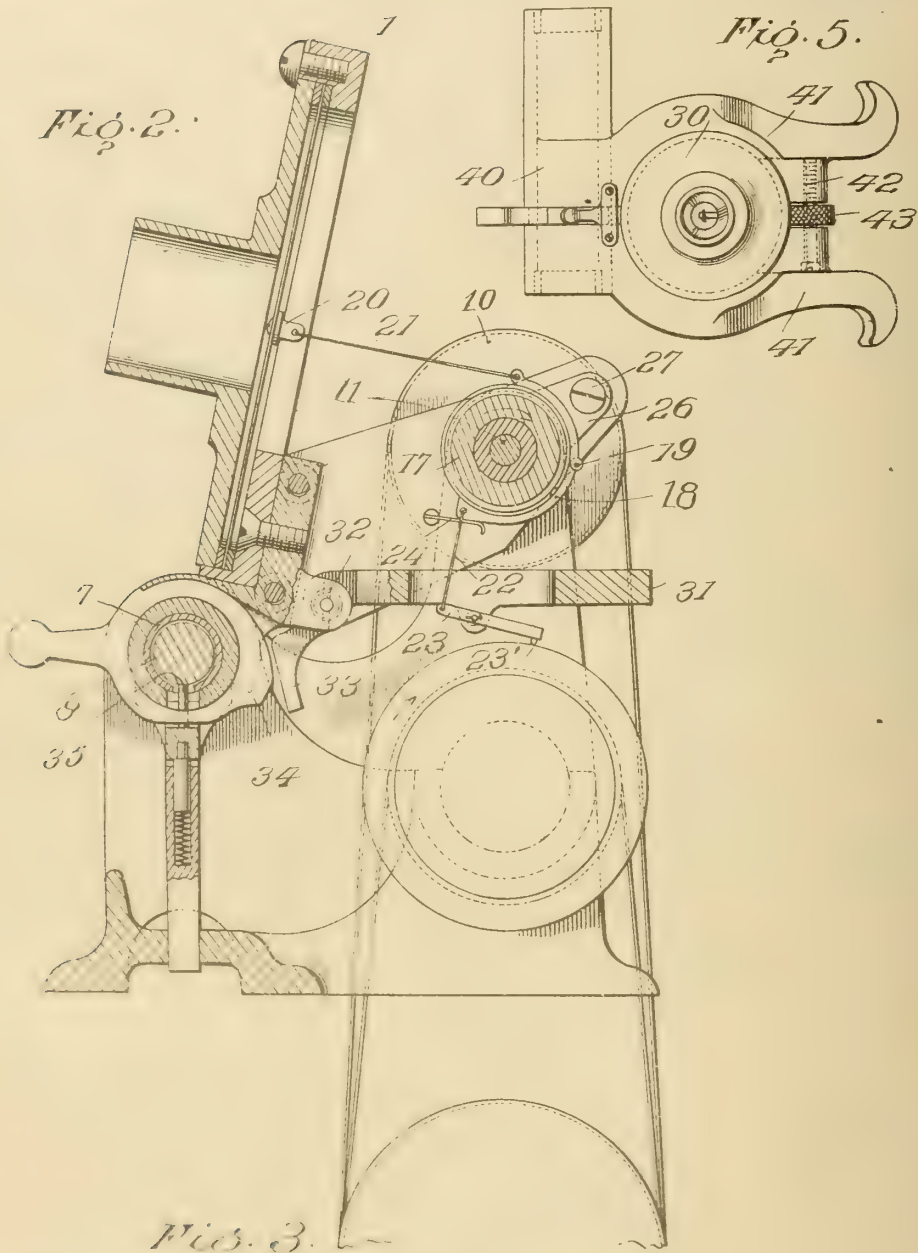


Fig. 5.

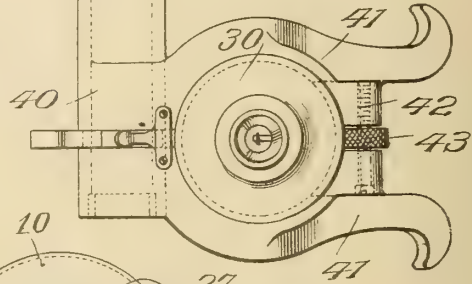
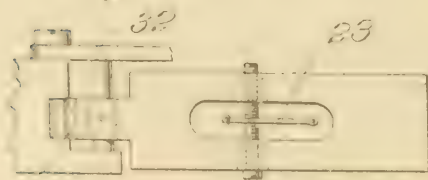


Fig. 3.



Inventor

Thomas H. Macdonald,
 by

Lawrence Cameron Lewis & Massie,
 Attorneys.

Witness
 Wm. B. H. ...
 Master L. Thompson

UNITED STATES PATENT OFFICE.

THOMAS H. MACDONALD, OF BRIDGEPORT, CONNECTICUT, ASSIGNOR TO AMERICAN GRAPHOPHONE COMPANY, OF BRIDGEPORT, CONNECTICUT, A CORPORATION OF WEST VIRGINIA.

PHONIC APPARATUS.

942,089.

Specification of Letters Patent.

Patented Dec. 7, 1909.

Application filed December 21, 1904. Serial No. 237,857.

To all whom it may concern:

Be it known that I, THOMAS H. MACDONALD, a resident of Bridgeport, Connecticut, have invented a new and useful Improvement in Phonic Apparatus, which invention is fully set forth in the following specification.

This invention relates to machines for recording and reproducing sounds, and particularly to machines of the type wherein frictional force is employed to actuate a diaphragm or other secondary vibrating means, the sonorous vibrations being employed to modify such frictional force and to mold it, so to speak, into the form of sound waves. Apparatus of this type is described in U. S. Patent No. 678,566, granted July 16, 1901, to Daniel Higham.

The object of the present invention is to furnish mechanism for carrying out, in a practical way, the invention of said patent, and other improvements invented by said Higham which have not yet been made public, and which are shown herein although they are not of my invention.

The improvements constituting the present invention will be clearly understood from the following description, taken in connection with the accompanying drawings, wherein—

Figure 1 is a front elevation and Fig. 2 is a cross-section of a graphophone which, except as hereinafter pointed out, is or may be of any known or suitable type; Fig. 3 is a plan view of a detail; Fig. 4 is a view, with parts in section, of the combined weight-lifting and carriage feed-disconnecting means, embodied in a graphophone not employing the intermediate sound-amplifying means illustrated in the preceding figures. Fig. 5 is a front view of Fig. 4; and Fig. 6 is a detail of a reproducer embodying part of the invention.

The main object of the present invention is to provide for the mounting of the friction means upon the longitudinally-movable carriage which, in the graphophone and other leading machines, supports the recorder or reproducer. Heretofore it has been proposed to mount the friction-means upon a fixed support, and to rotate and advance the mandrel carrying the record-cylinder.

In the drawings, the carriage 6, the tube 7 upon which the carriage is mounted and

freely slides, and the feed-screw 8 within the tube, are all constructed and operate in the usual manner.

The end plate 9 on the left end of the main frame is carried up to form a support for the pulley 10 and the shaft 11. The pulley 10 is carried by a sleeve 14 which is arranged to run in a fixed sleeve 12 which is fastened to the upright end 9 of the frame. Through this revolving sleeve 14 passes the shaft 11. The shaft has a spline-groove 15 cut in it as shown, in which the screw 16 in the revolving sleeve 14 engages. As the pulley 10 revolves it will therefore revolve the shaft 11, at the same time allowing the shaft freedom to slide back and forth with the carriage. On the other end of this shaft 11 is attached the friction-roll 17, which is provided with a shallow V-shaped groove, in which a friction shoe 18 is fitted. This shoe is hinged in the center at 19, as shown. One end of this shoe is attached to the center of the diaphragm at 20 by the link 21. To the other end is attached the link 22 which connects to the end of the ordinary or any suitable reproducer lever 23, as shown. A small spring 24 serves to keep the end of the shoe pressed against the friction roll 17. On the extreme end of the shaft 11 is placed the weight 25. The bearing of the sliding shaft 11 in the carriage is not fixed but is hung on a stirrup 26 which is pivoted on the screw 27. The action of the weight 25 therefore is to force down the carriage end of the shaft; this same weight acting as a constant pressure in the friction shoe effects an automatic adjustment of the friction by gravity.

The frame 1 in which the diaphragm is mounted is fixed to the carriage, and the carriage itself is not lifted, as heretofore, to disengage the stylus 23' from the record cylinder. Said stylus is, as shown, pivoted to a weight 31, which in turn is pivoted at 32 to the carriage, and has an extension 33 which contacts with the lifting cam 34 to lift the weight. The latter is constructed and operates in the usual way, so that, by depressing its handle the nut 35 is disengaged from the feed-screw 8, and the weight 31 simultaneously lifted.

This improvement may be usefully applied to machines in which the diaphragm is operated directly from the sound record without intermediate friction, or other

sound-amplifying, means. Such application of the said improvements is illustrated in Figs. 4 and 5. In these figures, the weight 31 is pivoted to the casing 30 at 32, and has an extension 33, which contacts with the lifting cam 34 to lift the weight. The pivoted weight 31 is provided with means for centering it when lifted by cam 34. This centering device consists of a thin metal plate 36 having a circular hole 37 through which passes the limit pin 38 (Fig. 6). Extending upwardly from this hole is a slot 39 into which the pin enters and by which the weight is centered when raised. When lowered, the size of the hole 37 allows to the pin 38 all play necessary for adjustment.

For the purpose of securely clamping the reproducer casing 30 in the lyre-shaped frame 40, there is provided between the two branches 41 thereof a screw 42, of which the head is connected to one branch and the point engages the other. In the middle of this screw is fastened a milled nut 43 which, when rotated either one way or the other, draws the branches together, or permits them to spring apart slightly. When the reproducer is to be placed in position in the frame, the nut is given a left-hand turn which permits the branches to slightly spring apart. The reproducer casing may then be dropped into position, and there securely clamped by imparting a right-hand turn to the nut 43, which causes the two sides of the lyre to be drawn slightly together.

The mounting of the friction roll on a shaft which has a swinging bearing so that it rests by gravity in the friction shoe, and the particular form of friction-means herein shown and described are not of my invention.

What is claimed is:

1. In a phonic apparatus, the combination with primary and secondary vibrating means, of intermediate friction means including a friction roll and shoe, a movable carriage supporting said friction means, and a shaft carrying said roll and having one bearing on said carriage and having a sliding connection with another bearing on a stationary part of the frame.

2. In a phonic apparatus, the combination with primary and secondary vibrating means, of intermediate friction means including a friction roll and shoe, a movable carriage supporting said friction means, a shaft carrying said roll and having a bearing on said carriage, a rotating sleeve having a bearing on the frame, and a connection whereby said shaft rotates with said sleeve but can slide freely therein.

3. In a phonic apparatus, the combination with primary and secondary vibrating means, of intermediate friction means including a friction roll and shoe, a movable carriage supporting said friction means, a

shaft carrying said roll, a bearing for said shaft pivoted on said carriage so that the roll rests by gravity against the shoe, another bearing on a stationary part of the frame, and a sliding connection between said shaft and one of said bearings.

4. The combination with the carriage and means for propelling the same, of a diaphragm mounted on said carriage, a weight pivoted independently of said diaphragm, and means for disengaging said propelling means and simultaneously lifting said weight independent of the diaphragm.

5. The combination with the carriage and means for propelling the same, of a diaphragm, a weight pivoted independently of said diaphragm, a stylus pivoted to said weight, friction means between said stylus and diaphragm, and means for disengaging said propelling means and simultaneously lifting said weight.

6. The combination with the diaphragm, of a pivoted weight, a stylus-lever pivoted to said weight, means for lifting said weight to disengage said stylus from the sound-record, and means for centering said weight when lifted.

7. The combination of a reproducer, a frame therefor comprising two resilient branches, means connecting said branches and operable at will to overcome the resiliency of said branches or permit the branches to move under the influence of said resiliency, as desired.

8. The combination of a reproducer, a frame therefor comprising two branches, a screw connecting said branches, and a nut fastened to said screw and adapted to be rotated in one direction to permit the branches to spring apart and in the other direction to draw the branches closer together.

9. In a phonic apparatus, the combination with primary and secondary vibrating means, of an intermediate friction device, and a movable carriage supporting said friction device.

10. In a phonic apparatus, the combination with primary and secondary vibrating means, of an intermediate friction device, and a movable carriage supporting said secondary vibrating means and said friction device.

11. In a phonic apparatus, the combination of primary and secondary vibrating means, means connecting the same, an intermediate movable friction device operating upon said connecting means, a movable carriage for supporting said friction device, and means for feeding said means and said carriage.

12. In a talking machine, the combination of a carriage and propelling means therefor, a diaphragm on said carriage, a stylus connected to said diaphragm, and means simultaneously disconnecting said propelling

means and lifting said stylus independently of the diaphragm.

13. In a talking machine, the combination of a movable carriage, means for propelling the same, a diaphragm mounted on said carriage, a pivoted weight also supported by the carriage, a stylus connected to said diaphragm and weight, and means simultaneously disconnecting said propelling means and turning said weight on its pivot independent of the diaphragm.

14. In a talking machine, the combination of a movable carriage and propelling means therefor, with a casing mounted on said carriage, a diaphragm supported by the casing, a pivoted weight, a sound record, a stylus connected to the weight and diaphragm and in operative relation with the record, and means simultaneously disconnecting said propelling means and lifting said weight independently of the diaphragm.

15. In a talking machine, the combination of a movable carriage, a sound box thereon containing a diaphragm, propelling means for said carriage, a sound record, a stylus connected to the diaphragm and in operative relation with said record, and means simultaneously disconnecting said propelling means and disengaging said stylus from the record independent of the sound box.

16. In a phonic apparatus, the combination of a phonographic record surface, means for rotating said surface, a carrier movable across said surface, a phonographic-stylus and friction wheel carried by the carrier, a friction member connected to said stylus and pressing against the friction wheel, and means representative of sound vibrations for varying the friction between said friction member and friction wheel, substantially as set forth.

17. In a phonic apparatus, the combination of a traveling carriage, a friction wheel and phonographic-stylus carried thereby, a

friction member pressing on said wheel and connected to said stylus, means for driving said friction wheel and means representative of sound vibrations for varying the amount of friction between the friction member and friction wheel, substantially as set forth.

18. In a phonic apparatus, the combination of a rotating mandrel, a carriage movable longitudinally thereof, a phonographic-stylus and friction wheel carried by the carriage, a friction member pressing on said friction wheel and connected to said stylus, and common driving means for moving the carriage and rotating the friction wheel, substantially as set forth.

19. In a phonic apparatus, the combination of a rotating mandrel, a carriage movable longitudinally thereof, a phonographic-stylus and friction wheel carried by the carriage, a friction member pressing on said friction wheel and connected to said stylus, common driving means for moving the carriage and rotating the friction wheel, and means representative of sound vibrations for varying the friction between the friction member and friction wheel, substantially as set forth.

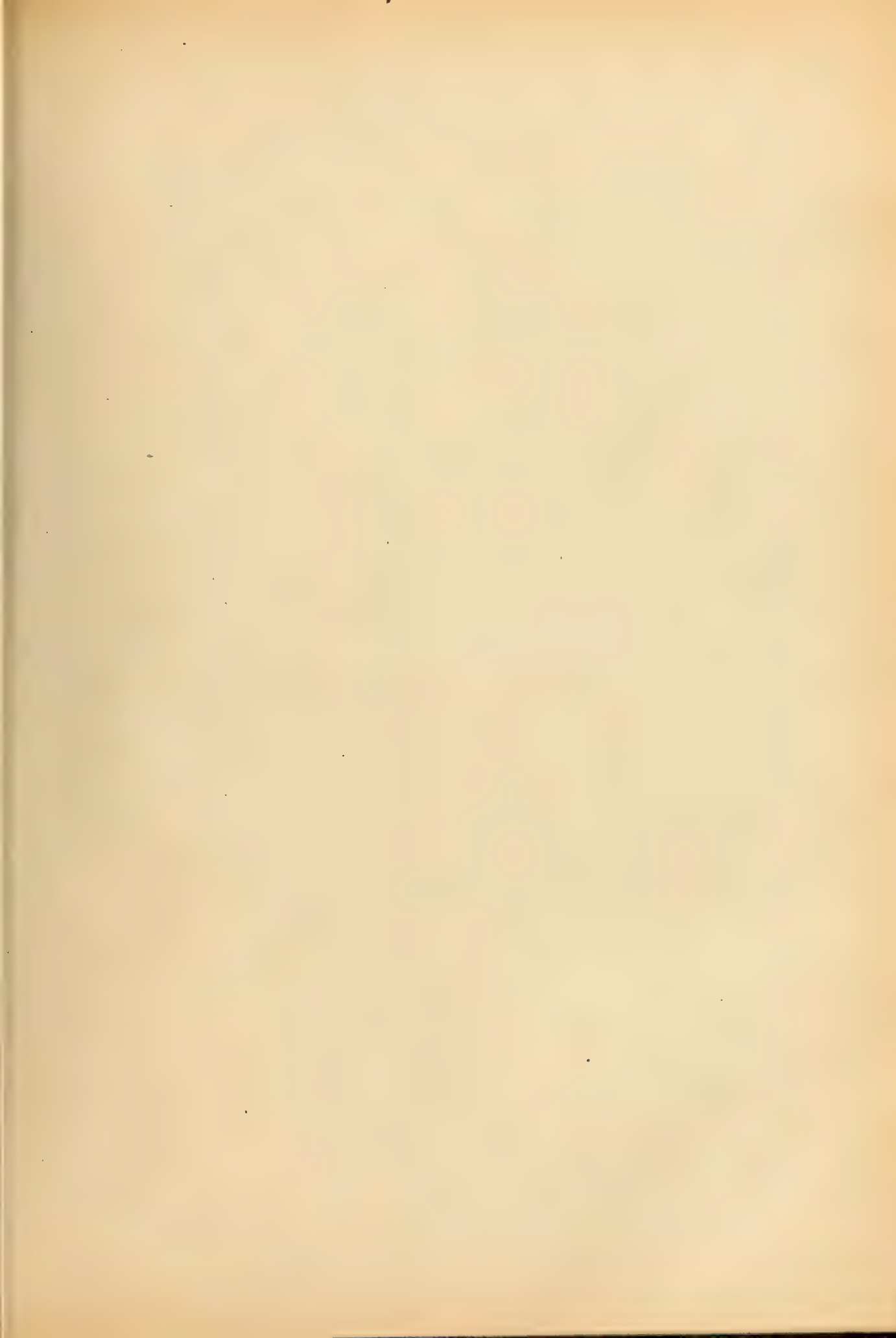
20. In a phonic apparatus, the combination of a primary vibrating stylus, a secondary vibrating diaphragm, means connecting the same, an intermediate movable friction device operating upon said connecting means, a movable carriage for supporting said friction device and a common feeding means for said carriage and said diaphragm, stylus and connecting means.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

THOMAS H. MACDONALD.

Witnesses:

C. B. INGALLS,
A. B. KEOUGH.



P. WEBER.

PHONOGRAPH.

APPLICATION FILED APR. 8, 1908.

942,475.

Patented Dec. 7, 1909.

2 SHEETS—SHEET 1.

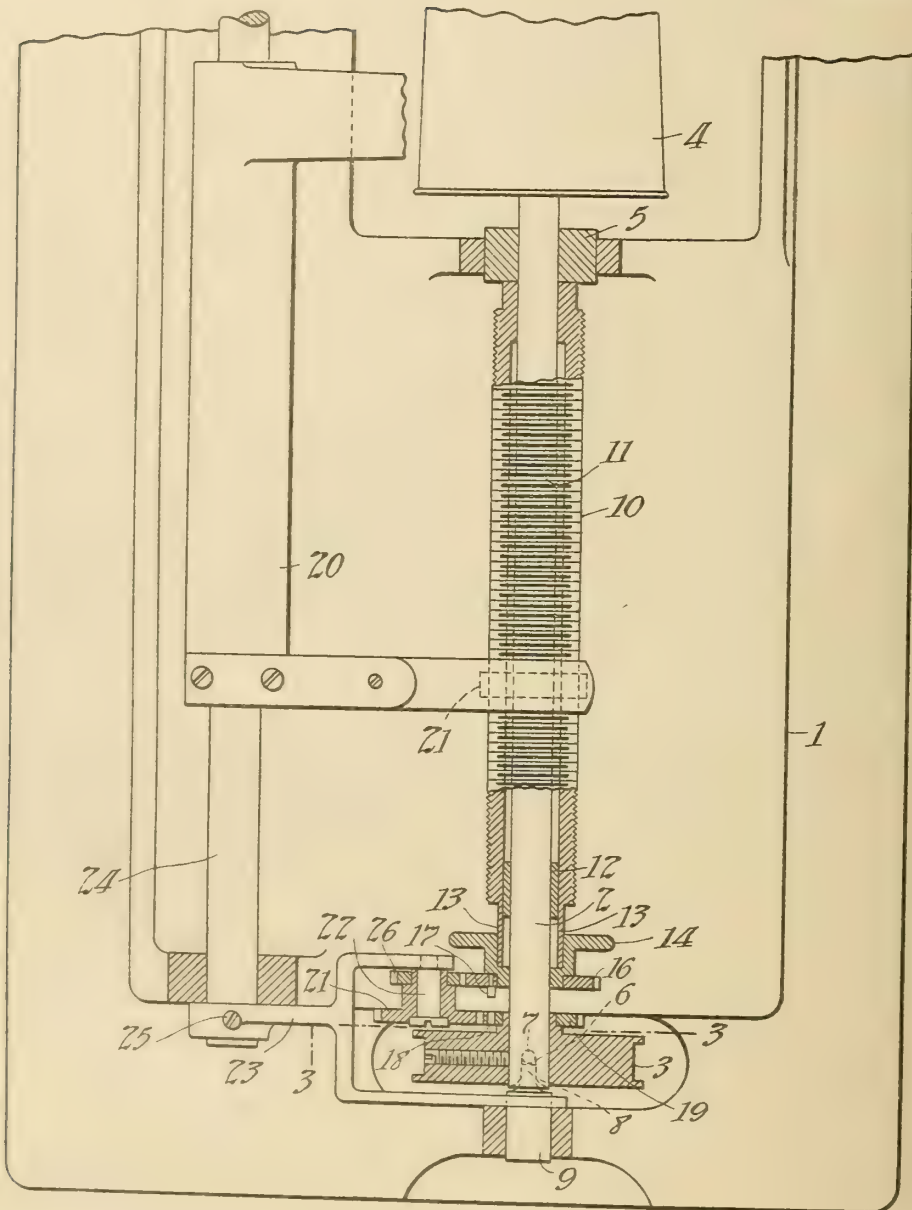


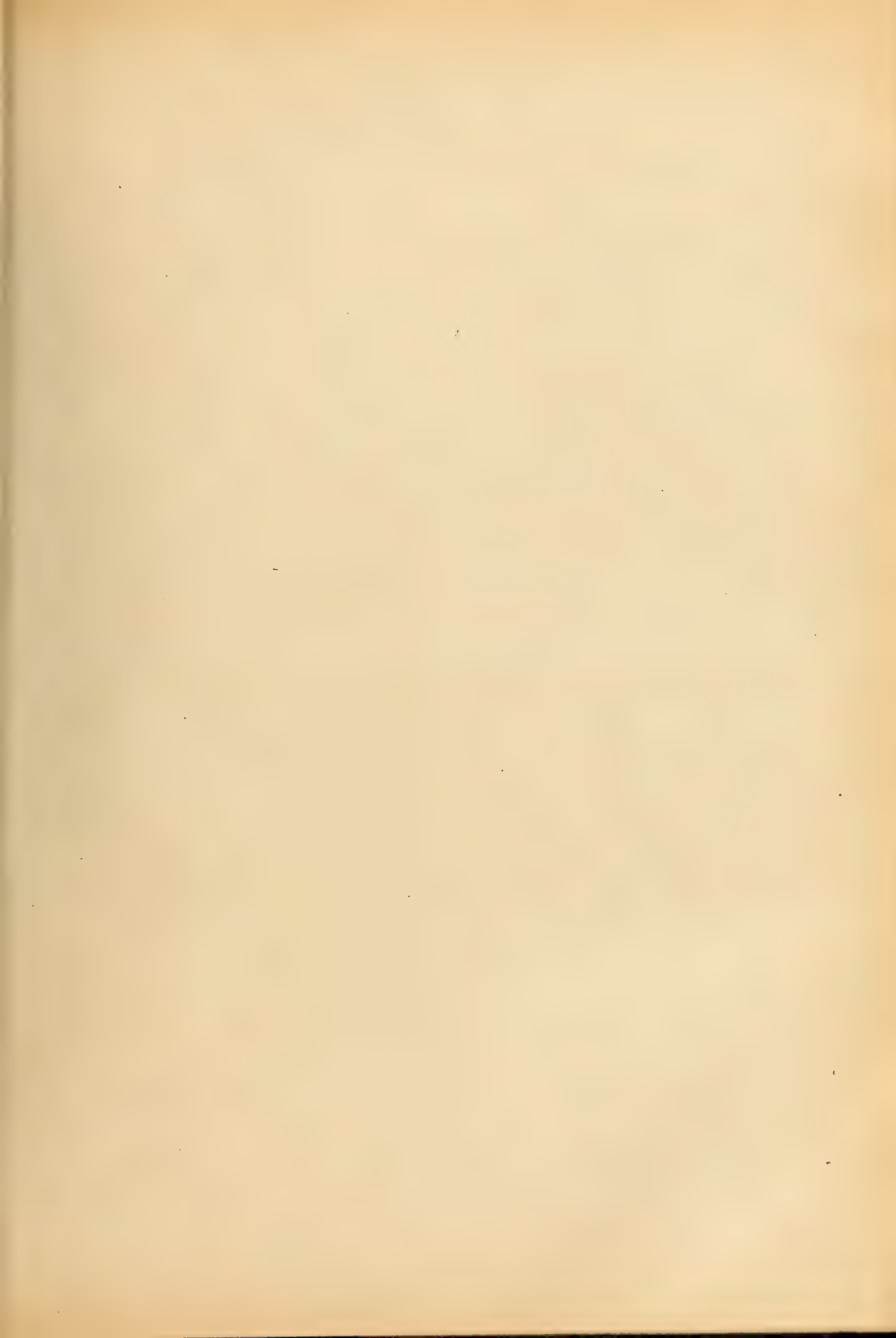
Fig. 1

Witnesses:

Frank Shure
J. M. Langfield

Inventor:

Peter Weber
by Frank L. Shure
Atty.



P. WEBER.
PHONOGRAPH.

APPLICATION FILED APR. 8, 1908.

942,475.

Patented Dec. 7, 1909.

2 SHEETS—SHEET 2.

Fig. 2

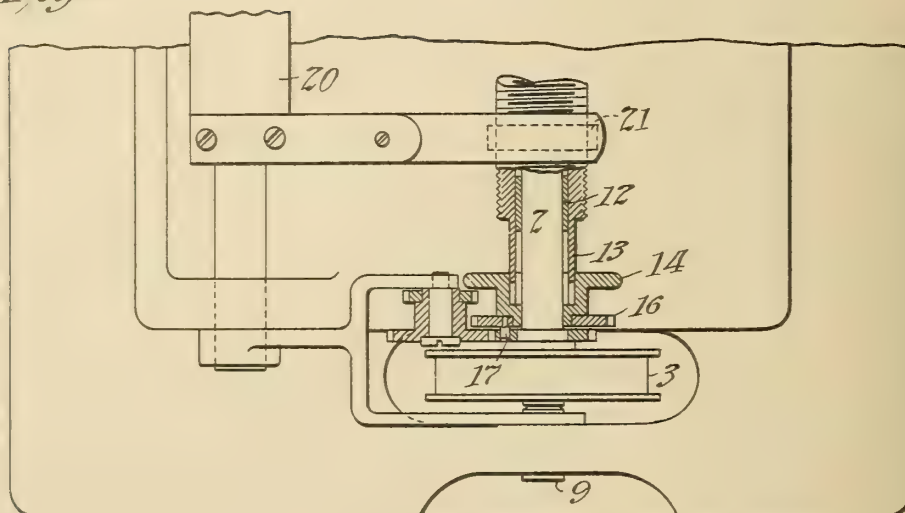


Fig. 4

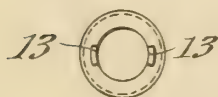


Fig. 5

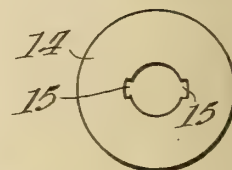
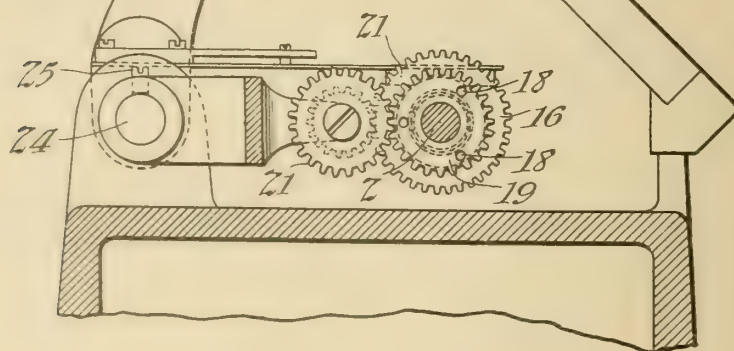


Fig. 3



Witnesses:

Fraut O'Leary
W. Laugel

Inventor:

Peter Weber

by Frank L. O'Leary

Atty.

UNITED STATES PATENT OFFICE.

PETER WEBER, OF ORANGE, NEW JERSEY, ASSIGNOR TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

PHONOGRAPH.

942,475.

Specification of Letters Patent.

Patented Dec. 7, 1909.

Application filed April 8, 1908. Serial No. 425,844.

To all whom it may concern:

Be it known that I, PETER WEBER, a citizen of the United States, residing at Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Phonographs, of which the following is a description.

My invention relates to phonographs and has for its object the provision of interchangeable means for feeding the traveling carriage upon which the sound box is mounted at either of two rates of speed, one of which may be suitable for operating upon a record of one hundred threads per inch, and the other for operating upon a record having 200 threads per inch. The particular means employed by me comprises a hollow rotary feed screw mounted concentrically with respect to an inner shaft, and capable of being locked to said shaft so as to rotate therewith, or of being unlocked therefrom and driven through interposed gearing so as to rotate at a different rate of speed.

In order that my invention may be more fully understood, reference is hereby made to the accompanying drawing, forming part of this specification, and in which—

Figure 1 is a plan view partly in section, of a phonograph constructed in accordance with my invention, the parts being arranged for feeding the sound box carriage at a suitable speed for operating upon records having two hundred threads per inch; Fig. 2 is a similar view, showing the parts arranged for feeding the carriage at a suitable speed for operating upon records having one hundred threads per inch; Fig. 3 is a section on line 3—3 of Fig. 1; Fig. 4 is an end view of the feed screw shaft; and Fig. 5, is a face view of the sleeve which engages the end of the said shaft.

In these views corresponding parts are represented by the same numerals of reference.

The phonograph shown is of a well-known type, and comprises a base or body 1, upon which is rotatably mounted the main shaft 2, which carries at one end, the drive pulley 3, and at the opposite end the mandrel 4, for supporting the sound record. This shaft may be supported in any suitable manner, but I have shown the same journaled in a bearing 5 intermediate its ends, and the end upon which the pulley is mounted is cupped,

as shown at 6, to receive a spherical roller or ball 7, and a stud or center 8 formed on the pin 9, which is secured to the body 1. Upon the shaft 2 is rotatably mounted a hollow shaft 10, formed with a feed screw 11 of fine pitch, preferably one hundred threads to the inch, said screw shaft being journaled at its inner end directly upon the shaft 2, as shown, and its outer end upon a bearing sleeve 12, interposed between the two shafts. The outer end of the screw shaft 10 is cut away to form a pair of oppositely disposed tongues 13, and upon the shaft 2 is slidably mounted a sleeve 14, having a pair of notches 15, which receive the tongues 13, of the shaft 10, thereby keying said members together. Upon the sleeve 14 is fixed a spur gear 16, which is provided with one or more pins 17 projecting from its face and adapted to engage holes or openings 18, formed in the spur gear 19, which is fixed upon the hub of the drive pulley 3. When in this position, as illustrated in Fig. 2, the gears 16 and 19 are locked together and the screw shaft 10 is therefore locked to the drive pulley 3 and shaft 2, and rotates at the same speed, and therefore feeds the sound box carriage 20 by reason of the engagement of the feed nut 21 with the screw 11 at a rate suitable for operating upon records having one hundred threads per inch.

Meshing with the gear 19, is a spur gear 21, which is journaled on a pin or stud 22, carried by a frame 23. This frame is sleeved at its rear upon the back rod 24, and secured by the set screw 25; the forward end of said frame is supported by the pin 9.

Upon the hub of the gear 21 is fixed a spur gear 26, which is adapted to mesh with the gear 16, when the latter is in the position shown in Fig. 1. When the parts are in these positions, the hollow shaft 10 rotates upon the shaft 2, and is driven from the pulley 3 through the gear train 19, 21, 26 and 16, which gears are so proportioned as to drive the shaft 10 at half the speed of the shaft 2, and thereby feed the carriage 20 at a rate suitable for operating upon records having two hundred threads per inch. In order therefore, to render the instrument capable of operating upon records having one hundred threads per inch, it is necessary only to move the sleeve 14 into such a position as to lock the gear 16 to the gear 19 by

the engagement of the pins 17 with the openings 18, as shown in Fig. 2, and in order to adapt the instrument to operate upon records having two hundred threads per inch, it is necessary only to move the sleeve 14 from the position of Fig. 2 into that of Fig. 1.

Having now described my invention, what I claim is:

10 1. In a phonograph, the combination with the rotating hollow feed screw shaft, of a rotary power shaft within said screw shaft, means for locking said shafts together so as to rotate at the same speed and interchangeable means for gearing said shafts together so as to rotate at different speeds, substantially as set forth.

2. In a phonograph, the combination with the rotary hollow feed screw shaft, the traveling carriage and means co-acting with the feed screw for progressing the same, of a sound record support, a main shaft adapted to rotate said support and situated within the feed screw shaft, means for driving said main shaft, and interchangeable means for driving said feed screw shaft from said main support at different speeds, substantially as set forth.

3. In a phonograph, the combination of the main shaft adapted to rotate the sound record support, a rotary hollow feed screw shaft surrounding said main shaft, a slidable sleeve rotatable with said screw shaft, a partial gear train coupling and gear means carried by said sleeve, said sleeve being adapted thereby to interchangeably couple said shafts together directly and through said gear train, whereby one shaft may be driven from the other at different rates of speed, substantially as set forth.

4. In a phonograph, the combination of a main shaft adapted to rotate the sound record support, a rotary hollow feed screw shaft surrounding said main shaft and adapted to impart a progressive movement to the sound box carriage, and means for gearing said screw shaft to said main shaft, substantially as set forth.

5. In a phonograph, the combination of a rotary main shaft, a rotary hollow screw shaft surrounding the same, and a gear train between said shafts adapted to drive the hol-

low shaft at one-half the speed of the main shaft, substantially as set forth.

6. In a phonograph, the combination of the main shaft adapted to rotate the sound record support, a rotary hollow feed screw shaft surrounding said main shaft, a drive pulley secured to said main shaft, a splined sleeve slidable upon said screw shaft, and means for coupling said sleeve and pulley together, substantially as set forth.

7. In a phonograph, the combination of the main shaft adapted to rotate the sound record support, a rotary hollow feed screw shaft surrounding said main shaft, a drive pulley secured to said main shaft, a gear secured to said pulley, a splined sleeve slidable upon said screw shaft, a gear secured to said sleeve and facing said first named gear, and coupling means and gear means for coupling said gears together directly or indirectly according to the position of said sleeve, substantially as set forth.

8. In a phonograph, the combination of the shaft 2, hollow shaft 10 surrounding the same, sliding gear 16 rotatable with said hollow shaft, gear 19 rotatable with said shaft 2, gears 21 and 26, and means for locking said sliding gear to the shaft 2 when out of mesh with the gear 26, substantially as set forth.

9. An attachment for phonographs, comprising a removable frame 23 adapted to be secured to the back rod of the phonograph, and a pair of gears 21 and 26 rotatable upon said frame, substantially as set forth.

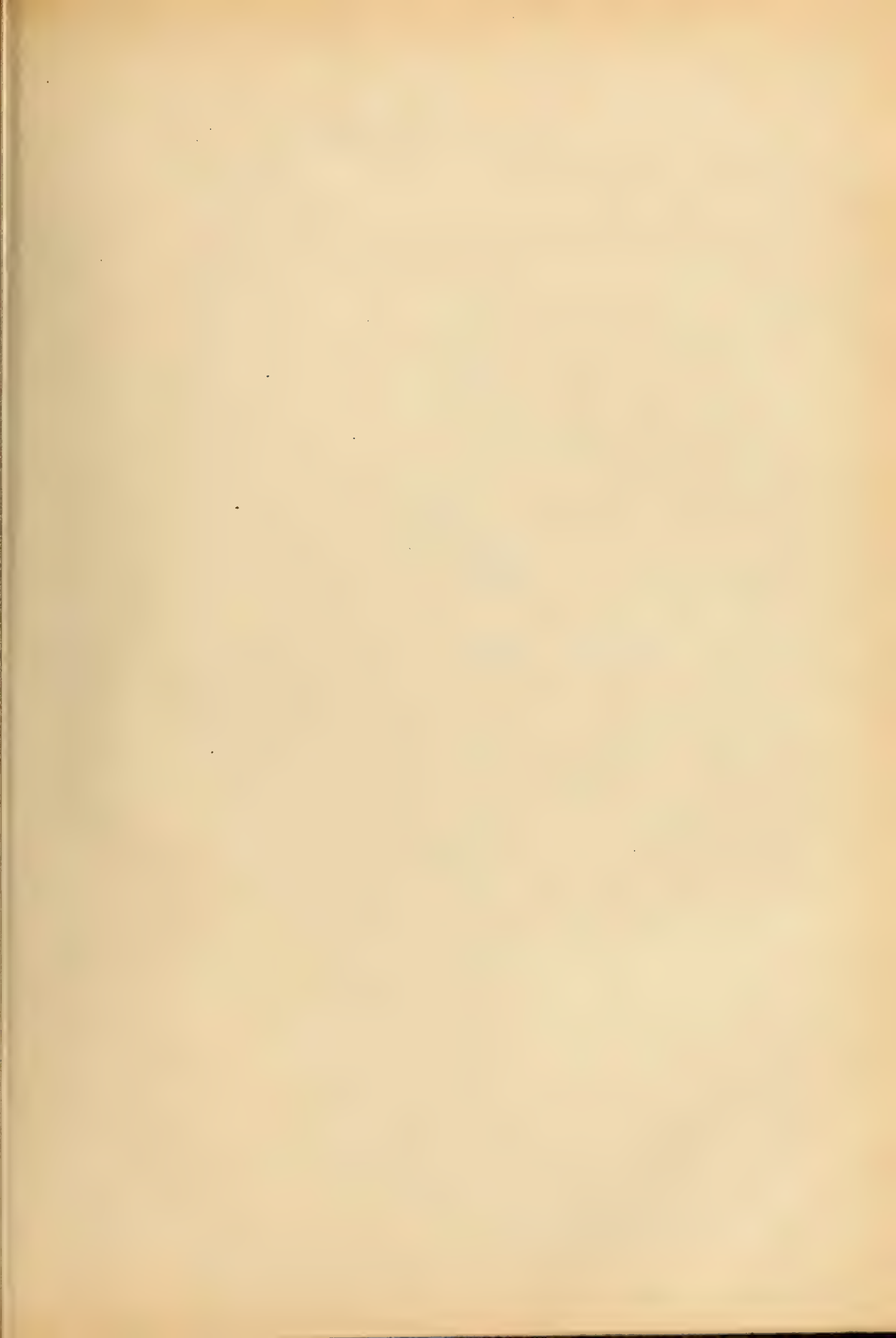
10. In a phonograph, the combination of a main shaft adapted to rotate the sound record support, a bearing for the same, and a member longitudinally in line with the end of said shaft, said shaft and member being formed, one with a socket and the other with a stud entering the same, and a roller between the end of said stud and the bottom of said socket, substantially as set forth.

This specification signed and witnessed this 6th day of April, 1908.

PETER WEBER.

Witnesses:

FRANK D. LEWIS,
H. H. DYKE.



942,816.

Fig. 1.

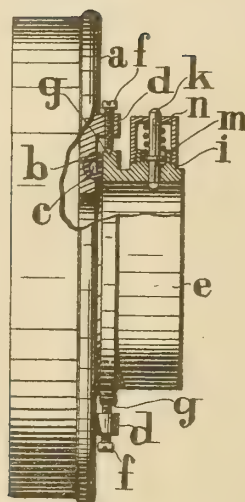


Fig 2.

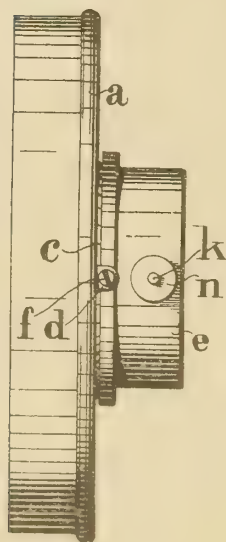
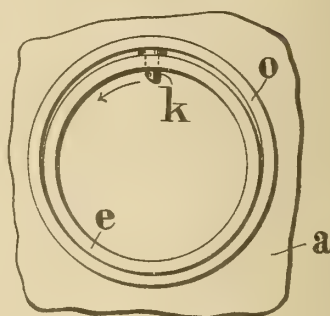


Fig.3.



Admission
27th Oct
Gleneta

Inventor:
A. Fischer
By Wilkinson, Jinks & Walker
his Attorney.

UNITED STATES PATENT OFFICE.

ALEX FISCHER, OF KENSINGTON, LONDON, ENGLAND.

SOUND-BOX FOR TALKING-MACHINES.

942,816.

Specification of Letters Patent.

Patented Dec. 7, 1909.

Original application filed February 3, 1908, Serial No. 414,070. Divided and this application filed October 23, 1908. Serial No. 459,207.

To all whom it may concern:

Be it known that I, ALEX FISCHER, a subject of the King of England, residing at 8 Maclise road, Kensington, in the county of London, England, have invented certain new and useful Improvements in the Construction of Sound-Boxes for Talking-Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to improvements in the construction of sound boxes for talking machines of the disk type and refers to certain details forming part of my former application for sound boxes filed February 3rd, 1908, Serial No. 414070, of which the present application is a division.

The present application refers particularly to the construction of the backs of sound boxes and to means for connecting the sound box to the tone arm or trumpet.

In order that my said invention may be better understood, I will proceed to describe the same with reference to the drawing accompanying this specification, in which:—

Figure 1 shows a side elevation of a sound box partly in section; Fig. 2 shows plan of same; Fig. 3 shows a modified form of the invention.

The same letters of reference are employed to denote the same parts in all the views:—

a shows the back plate of the sound box. This back plate is provided with an annular groove *b*, into which a rubber washer *c* (preferably tubular) is placed.

d, *d* show two small brackets attached to the back *a*.

e is a flanged tube forming the sound exit tube fixed on to the back of the sound box by center screws *f* screwing through the brackets *d* and into two center holes *g* in the flange of the tube *e*. In this position the flange *i* of the ring *e* presses tightly against the rubber ring *c*, making a flexible sound tight joint, which will allow the sound box a small turn around its vertical axis, the center screws forming the turning axis.

On the tube *e* I form a boss *z* into which a spring pin *k* is fitted, such spring pin being provided with a flange *m* to limit its

action, so that the bottom of the pin may enter a hole in the tone arm or trumpet in order to attach the sound box firmly thereto. *n* is a cap screwed on the boss *z* to hold the spring in position.

Fig. 3 shows a simplified form of spring for the pin. Instead of having the spiral spring and cap *n* screwed to the boss *z*, I have a rubber ring *o* passing around the tube *e* and over the head of the pin. At its lower end the spring pin is so formed that the sound box can only be turned in one direction, suitable means being employed to prevent the spring pin from turning around its vertical axis. Two holes (preferably opposite one another) are provided on the small end of the tone arm, on to which the sound box is pushed. In these holes the pin *k* springs, which will lock the sound box to the tone arm in the playing position, and with a half turn the sound box will be brought in position for changing the needle easily. The spring pin at its lower end is cut on the slant and will allow the sound box to be turned around in the direction as indicated by the arrow (Fig. 3), while a turn in the opposite direction will be impossible. By turning the sound box the pin held down by the spiral springs and cap or rubber ring will be pushed up, or slide up and ride on the top of the sound arm until the hole is reached again. An annular shallow groove may be provided on the tone arm connecting the two holes to form a guide for the pin to prevent the sound box from slipping off when not locked in the holes.

What I claim and desire to secure by Letters Patent of the United States of America is:—

1. The combination of a sound box having brackets, a flexible washer in contact with said box, a flanged tube bearing at one end on said washer, and screws passing through said brackets and into said tube, substantially as described.

2. The combination of a sound box having brackets and a groove thereon, a flexible washer in said groove, a flanged tube bearing on said washer, and screw passing through said brackets and into said tube, substantially as described.

3. The combination of a sound box having brackets and a groove on its back, a flexible washer in said groove, a flanged tube bear

ing one end washer, screws passing through said brackets and into said tube, and a spring-pressed pin carried by said tube, substantially as described.

4. The combination of a sound box having brackets, a flexible washer in contact with said box, a flanged tube bearing at one end on said washer, screws passing through a hole in said tube, and a rubber ring passing

around said tube and pressing said pin inward, substantially as described. 10

In testimony whereof, I affix my signature, in presence of two witnesses.

ALEX FISCHER.

Witnesses:

A. E. VIDAL,

L. SIMMONDS.



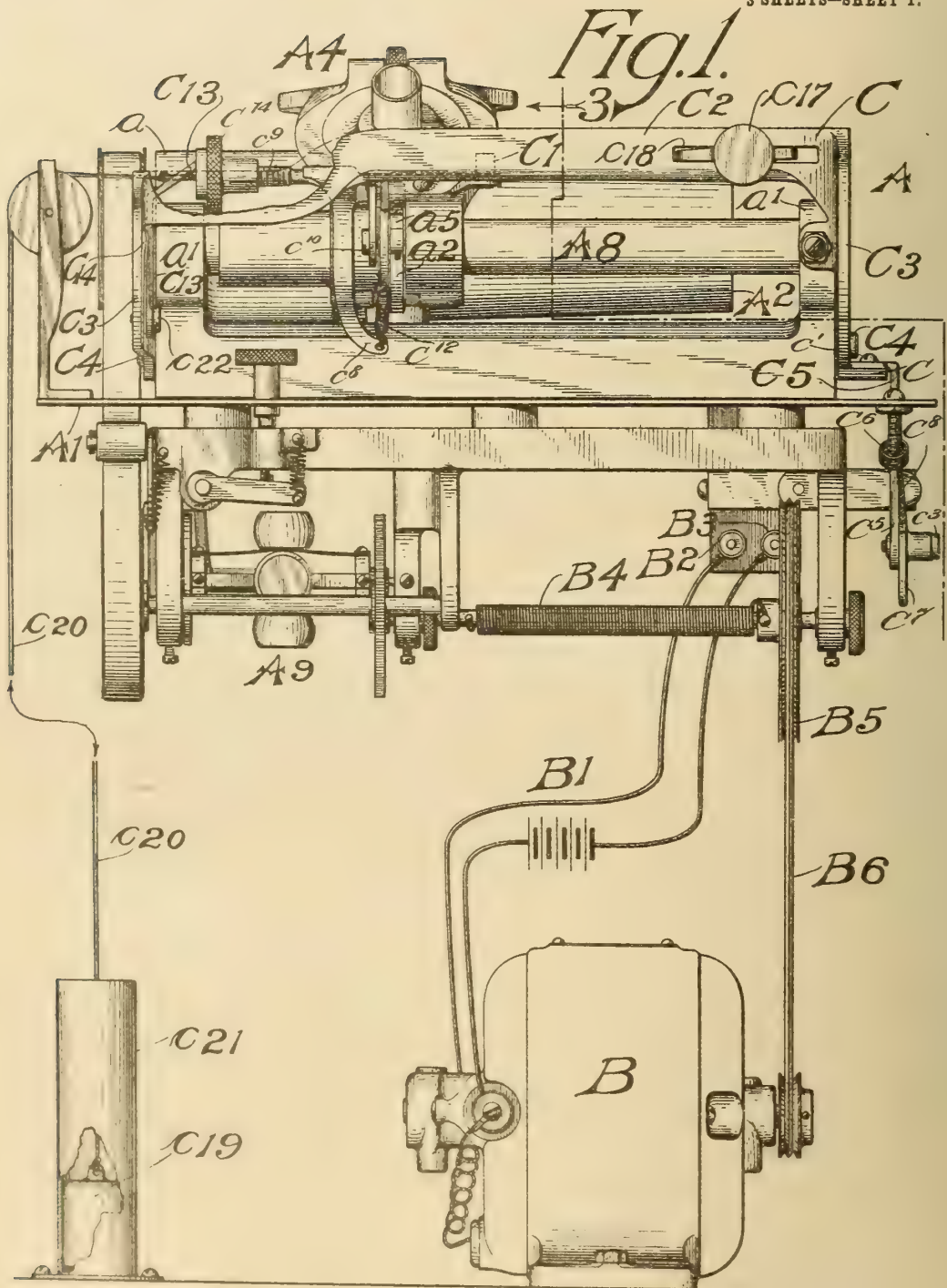
H. S. MILLS.
PHONOGRAPH.

APPLICATION FILED AUG. 24, 1907.

943,313.

Patented Dec. 14, 1909.

3 SHEETS—SHEET 1.



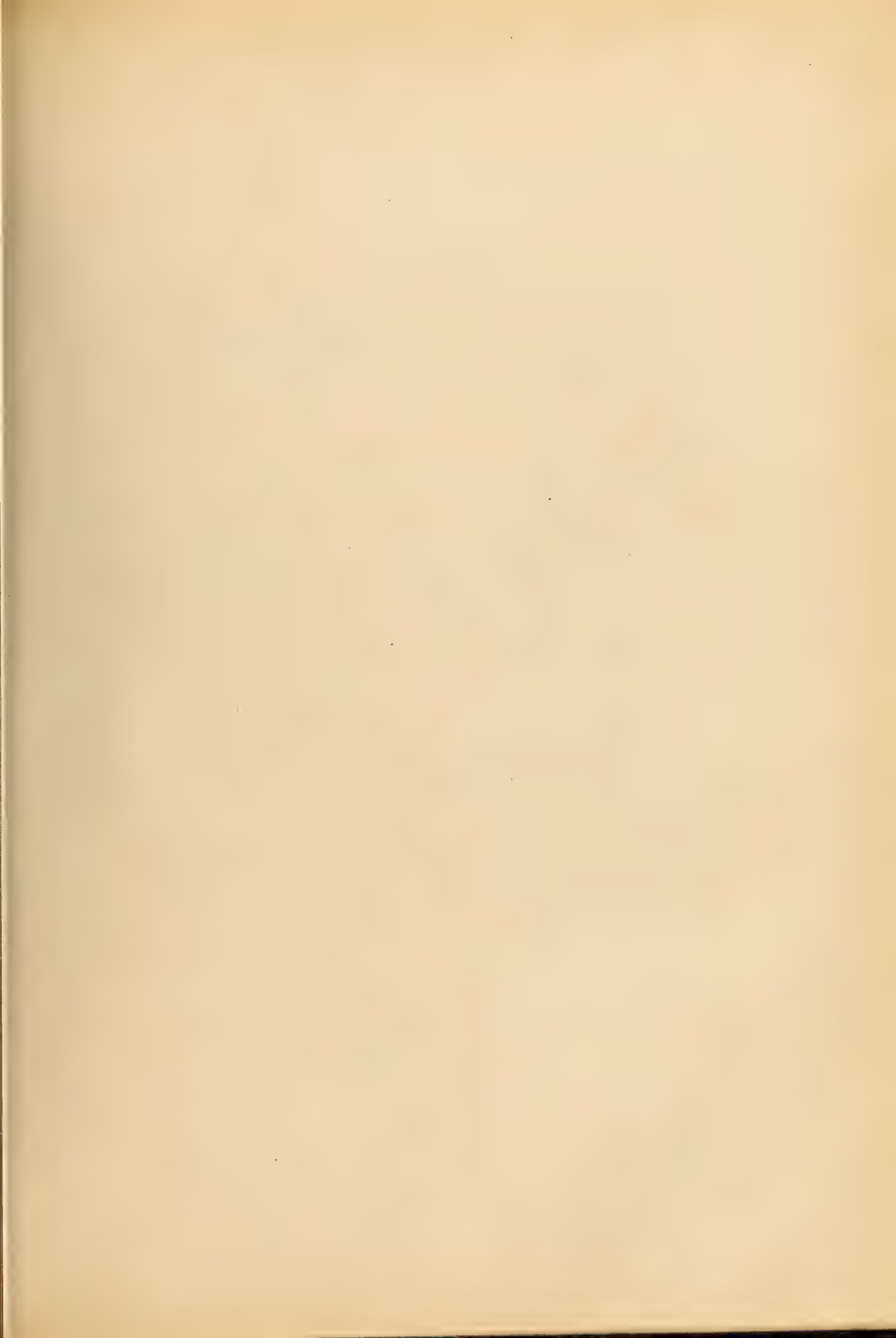
WITNESSES:

John F. Schindler.
Ralph O. Schindler.

INVENTOR:

HERBERT S. MILLS.

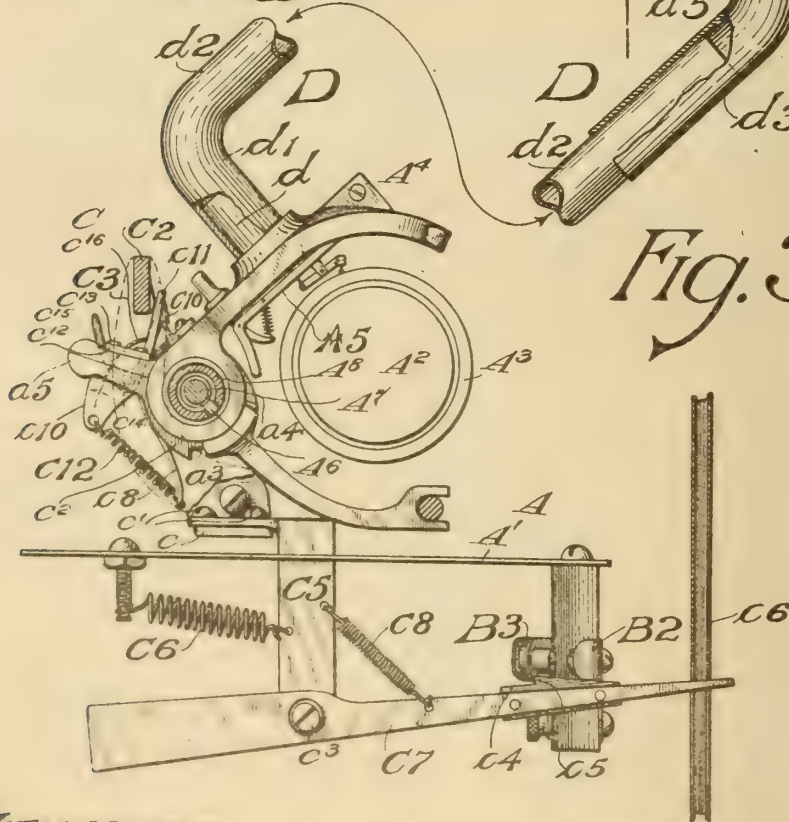
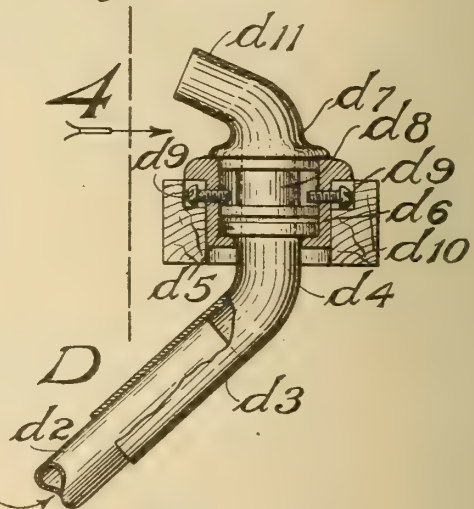
BY *Ryanfort & Co.* *Shulton & Wills.*
ATTYS.



APPLICATION FILED AUG. 24, 1907.

Patented Dec. 14, 1909.

3 SHEETS—SHEET 2.



INVENTOR:
HERBERT S. MILLS.

By *Lyons & Co. Shuttles & White,*
ATTYS.



H. S. MILLS.

PHONOGRAPH.

APPLICATION FILED AUG. 24, 1907.

Patented Dec. 14, 1909.

3 SHEETS—SHEET 3.

943,313.

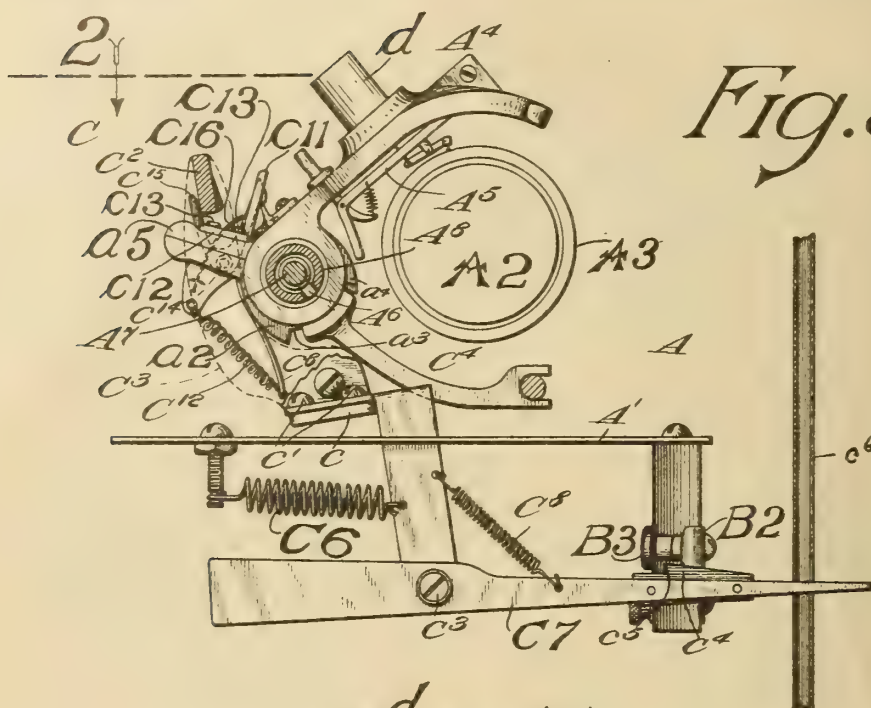


Fig. 5.

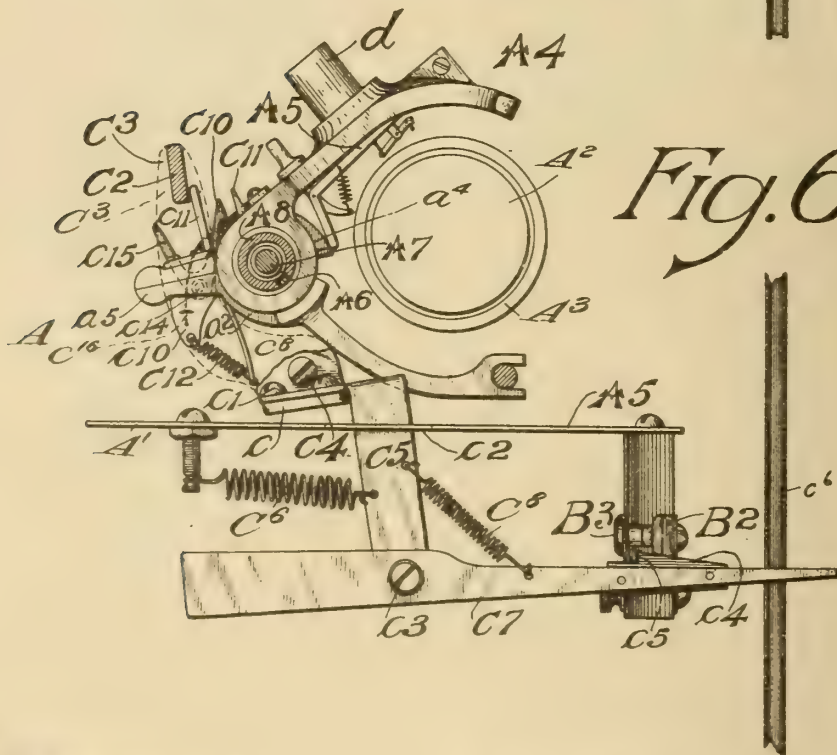


Fig. 6.

WITNESSES:

John F. Sandell
Ralph A. Schaefer

INVENTOR:

HERBERT S. MILLS.
BY *Dyremforth, Lee, Chittum & White*
ATTYS.

UNITED STATES PATENT OFFICE.

HERBERT S. MILLS, OF CHICAGO, ILLINOIS.

PHONOGRAPH.

943,313.

Specification of Letters Patent.

Patented Dec. 14, 1909.

Application filed August 24, 1907. Serial No. 389,933.

To all whom it may concern:

Be it known that I, HERBERT S. MILLS, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Phonographs, of which the following is a specification.

My invention relates to improvements in phonographs, and particularly to that class of phonographs which is intended for use in coin-controlled machines in which it is desired to repeat the record each time a coin is inserted in the machine.

My object is to provide a phonograph, of this class, of novel and improved construction, and my invention constitutes an improvement on that described in my application No. 352,672, filed Jan. 17, 1907.

The invention is illustrated in its preferred embodiment in the accompanying drawings, in which—

Figure 1 represents a front elevational view of phonograph mechanism constructed in accordance with my invention, a dash-pot or weight-guide employed being shown brokenly and moved from its proper position with relation to the other parts of the mechanism; Fig. 2, a broken plan view showing the relation of the reproducer and a cam-roller carried thereby to a shiftable cam-equipped bar which serves in the operation of breaking the electric circuit of the motor employed and also in releasing the latch which permits a spring-actuated cam-collar to elevate the needle-holder to withdraw the needle from the record, the view being taken approximately as indicated at line 2 of Fig. 5; Fig. 3, a broken sectional view taken as indicated at line 3 of Fig. 1, but showing a telescopic tube employed for connecting the reproducer-horn with the ear-trumpets of the machine; Fig. 4, a view taken as indicated at line 4 of Fig. 3; Fig. 5, a view similar to Fig. 3, but showing the switch of the electric circuit closed; and Fig. 6, a view similar to Fig. 5, but showing the shiftable bar mentioned in its shifted position and showing the needle withdrawn from the record.

It may be stated preliminarily that in the mechanism illustrated in the accompanying drawings power is transmitted from an electric motor through a power transmission torsion spring, as set forth in my above

mentioned application. In the preferred construction of the present invention, when the motor-circuit is completed, as may be accomplished by dropping a coin into the coin-chute, the motor operates, through the medium of the power-transmission coil-spring, to actuate the record and the reproducer feed-screw, causing the reproducer to traverse the record. The mechanism is provided with a shiftable cam-retracted member which carries a cam which is actuated by a cam-roller mounted on the reproducer, when the reproducer completes its movement across the record, and said member serves to release a latch which normally locks the cam-collar which serves to move the needle-holder, said cam-collar being provided with an actuating spring which serves to turn it upon its axis when said latch is released. Said shiftable member operates, also, to actuate a switch-retracting member which serves to break the circuit of the electric motor when said shiftable member is permitted to return, under the action of a strong spring with which it is provided, to its normal position. The shiftable member, or bar, when retracted, is locked in the retracted position by a spring-actuated member which moves into position between the shiftable member and an adjacent member of the frame when the member is shifted; and the reproducer is equipped with an adjustable member which serves to retract said bar-locking member when the reproducer is returned to its starting position. As will be understood from the description hereinafter given, I am able, by attaching simple parts to an ordinary phonograph, such as now can be obtained in the market, to provide for the automatic elevation of the needle from the record and the disconnection of the feed-screw clutch or nut from the feed-screw, maintaining said parts in this condition during the automatic return of the reproducer to the starting position, the breaking of the circuit of the electric motor employed for driving the phonograph, and the automatic lowering of the needle and reengagement of the clutch with its feed-screw upon the return of the reproducer to its starting position.

In the construction illustrated, A represents a phonograph comprising the usual parts, namely a frame A¹, a record carrier, or mandrel, A², fitted with a cylindrical rec-

and A', a reproducer-carrier A⁴ supporting a lever-form needle-holder A⁵ and equipped with a screw-clutch or nut A⁶, a reproducer-carrier feed-screw A⁷ contained within the reproducer-carrier guide A⁸ and geared to the shaft of the record-carrier A² in the usual manner, and a governor A⁹ of well known construction; B, an electric motor having a circuit B¹ fitted with contact-points B², B³, the latter of which is movable to permit the circuit to be broken as indicated in Fig. 3; B⁴, a shock-absorbing power-transmission torsion-spring actuated by a wheel B⁵ connected by a belt B⁶ to the motor shaft and serving to actuate the phonograph record, the governor and the reproducer feed-screw, as set forth in the above-mentioned application; C, circuit-controlling and needle-elevating mechanism actuated by the reproducer, and comprising a cam-roller C¹ carried by the reproducer, a shiftable cam-equipped switch-actuated bar C² extending parallel with and located in front of the reproducer-carrier guide, a pair of arms C³ supporting said bar and carried by pivots C⁴, an arm C⁵ rigidly connected with one of the arms C³, a spring C⁶ which tends to hold the bar C² in the position in which it is shown in Figs. 3 and 5, a switch-actuating link C⁷ pivotally connected with the arm C⁵ and connected therewith by a spring C⁸, a cam C⁹ adjustably connected with the bar C², a cam-collar latch C¹⁰ which normally engages a locking-lug C¹¹ carried by the reproducer-carrier and serves to prevent rotation of the cam-collar which serves to elevate the needle-holder and release the clutch from the feed-screw, and a spring C¹² whose function is to rotate said cam-collar when the latch C¹⁰ is released by the forward shifting of the bar C²; C¹³, a member movable to the right from the position shown in Fig. 1 under the action of a spring C¹⁴ which becomes interposed between the frame-member and the shiftable bar C², as shown in Fig. 2, when the bar is shifted to its forward position; C¹⁵, an adjustable member serving to return the member C¹³ to its normal position and permit the bar C² to resume its normal position when the reproducer returns to its starting position; and D, telescopic tube-connections between the reproducer and the cam-tramper (not shown).

The general construction of the phonograph illustrated is well understood, and it will be unnecessary to go into details, except as may be necessary to enable the description of the novel features which have been added to be understood. The frame A' has the usual standard *a* for supporting the rotary record carrier and the usual standards *a*¹ in which the reproducer-guide is mounted and the feed-screw journaled. Motion is communicated from the shaft of the record carrier by a train of gears (not

shown) to the feed-screw A⁷ in the usual manner. The record A³ is the usual cylindrical wax record.

The reproducer-carrier A⁴ is mounted upon its guide A⁸ in the usual well known manner. It is equipped with a rotary collar *a*² which is provided with the usual cam-surface *a*³ for retracting the screw-clutch or follower (usually of yoke-shape) and is further equipped with the usual cam-surface *a*⁴ for actuating the needle-holder A⁵. Said collar is further equipped with an arm *a*⁵, through the medium of which said collar may be turned upon its axis.

The motor B may be of any approved type of electric motor, and may derive its power from any suitable source. In the present instance, the contact members B², B³ are leaf-springs equipped with contact-points which are adapted to bear against each other and close the circuit as indicated in Fig. 5, the member B³ being adapted to be withdrawn through the medium of the member C⁷, as indicated in Fig. 3, thereby breaking the circuit.

The shiftable bar C² is adapted to swing about the axis formed by the pivots C⁴. One of the arms C³ which carry the bar C² is provided beneath its pivot with a lateral projection *c* to which is rigidly screwed the arm C⁵, as by means of screws *c*¹. The member C⁵ works in a slot *c*² in the frame-plate. The member C⁷ is connected with the arm C⁵ by a pivot *c*³, and said member C⁷ is equipped with an insulation-member *c*⁴ provided with a shoulder *c*⁵ which is adapted to engage the leaf-spring B³ and retract the same to break the circuit, as shown in Fig. 3. The member C⁷ is adapted to be released from the member B³ by means of a coin which may be dropped through the coin-chute *c*⁶ through a slot in which the member C⁷ extends. It will be understood that when the bar C² is shifted forwardly by the reproducer, as the latter nears the end of its traverse, the member C⁷ will be thrown rearwardly so as to be in position to engage the member B³; and when the reproducer returns to its starting position and releases the bar C², the arm C⁵ will be moved forwardly, thereby returning the member C⁷ to the position shown in Fig. 3 and breaking the electric circuit.

The cam-collar C¹ is mounted on a member *c*⁷ (see Fig. 2) which is rigidly connected with the reproducer-carrier. The member *c*⁷ is equipped with a downward extension *c*⁸ with which the lower end of the spring C¹² is connected. The member *c*⁷ is also equipped with a threaded stud *c*⁹ which carries the adjustable member C¹⁵, said member C¹⁵ being really a nut connected with said stud. Rigidly connected with the arm *a*⁵ of the cam-collar *a*² is a member *c*¹⁰ having an arm *c*¹¹ adapted to engage the bar

C². The upper end of the spring C¹² is connected with the member c¹⁰. The member c¹⁰ has a portion c¹² bent at right angles to over-lie the arm a⁵ of the cam-collar a², said
 5 portion being screwed to said arm by the same screws c¹³ which serve to connect the two parts of the separable cam-collar. The latch C¹⁰ is connected by a pivot c¹⁴ with the member c¹⁰. Said latch is provided with an
 10 arm c¹⁵ adapted to be engaged by the bar C² when the latter is shifted forwardly, thereby to release the latch C¹⁰ from the locking-lug C¹¹ and permit the spring C¹² to rotate the cam-collar a² and thereby elevate the
 15 needle or stylus and disengage the screw-clutch or collar. A spring c¹⁶ tends to hold the latch C¹⁰ in the locking position.

The cam C⁹ is connected with the bar C² by a screw c¹⁷ which extends through a slot c¹⁸ with which said bar is provided. The member C¹⁵ is adapted to strike against the standard a¹ of the frame when the reproducer is returned to its starting position, which is accomplished by a weight c¹⁹ which
 20 is connected by a cord c²⁰ with the reproducer-carrier and which is movable in a guide or dash-pot c²¹. The member C¹³ which serves to lock the shiftable bar in its forward position is loosely connected with
 25 one of the arms C³ by a screw c²², the connection being sufficiently loose to permit the spring C¹⁴ to swing the member C¹³ to the right to enable it to become interposed between the frame-member a¹ and the bar C²,
 30 as indicated in Fig. 2. The member C¹⁵ is adapted to strike an arm on the member C¹³, thereby forcing said member from between the frame-member a¹ and the bar C² so that the bar C² will be permitted to return to its
 35 normal position when the reproducer-carrier returns to its starting position. The member C¹⁵ is formed with shoulders c²³ and c²⁴ adapted, respectively, to engage the member C¹³ and the frame-member a¹.

The reproducer is equipped with a short tube or horn d upon which is swiveled the short arm d¹ of a metallic tube d² which has the angular form shown in Fig. 3, it being understood that the right-hand portion of
 40 Fig. 3 is shown removed from its normal position. The main arm of the tube d² normally occupies an inclined position and is telescopically received by the inclined portion of a tube d³ which has an upturned portion d⁴ whose upper end is formed with a
 45 flange d⁵ swiveled in a cup d⁶ having a perforated bottom through which the vertical portion d⁴ of the tube d³ extends. Swiveled in the cup d⁶ is a tube-section d⁷ having a circular groove d⁸ into which projects screws d⁹ which extend through the sides of the cup d⁶. The cup d⁶ is supported by a frame member d¹⁰ which constitutes, usually, a part
 50 of the cabinet of the machine. The tube section d⁷ has a horn d¹¹ with which the

union hose of the ear-trumpet tubes (not shown) is connected. It will be understood that as the reproducer-carrier moves, the upper portion of the telescopic tube which is composed of the members d², d³ turns within the cup d⁶, while the lower end of said telescopic tube turns upon the horn or pivot d. The telescopic tube, of course, changes its length as the reproducer travels across the machine.
 70

The operation will be readily understood from the foregoing detailed description. The circuit B¹ may be closed by depressing the rear end of the member C⁷, as by means of a coin, thus releasing the switch or spring-contact member B³. Thereupon the motor will actuate the phonograph, causing the reproducer to be fed across the record in the usual way. When the reproducer approaches the end of its operation, the cam-roller C¹ engages the cam C⁹ and shifts the bar C² forwardly, whereby the member C⁷ is thrust rearwardly. As the bar C² is shifted forwardly, it engages the arm c¹⁵ of the latch C¹⁰, thereby releasing the latch from engagement with the locking-lug C¹¹ and permitting the spring C¹² to rotate the cam-collar a² and elevate the needle and release the feed-screw clutch. During the forward shifting of the bar C² and before the release of the latch C¹⁰, the locking-member C¹³ is permitted to enter between the frame-member a¹ and the bar C², so that the bar C² will be temporarily locked in its forward position. As the cam-collar a² is rotated under the action of the spring C¹², the arm c¹¹, which is rigid with the cam-collar, is brought into engagement with the bar C². When the feed-screw clutch is disengaged from the feed-screw, the weight c¹⁹ operates to return the reproducer-carrier to its starting position, the member C¹³ is forced back to its normal position by the member C¹⁵, thereby permitting the bar C² to be thrown back to its normal position under the action of the relatively strong spring C⁶, which overpowers the spring C¹². Thus, the cam-collar a² is rotated, through the medium of the arm c¹¹, back to its normal position, thereby throwing the feed-screw clutch into reengagement and lowering the needle upon the record. It will be observed that the starting position of the reproducer may be regulated by adjusting the member C¹⁵, which determines the time when the bar C² shall be permitted to return to its normal position and permit the feed screw clutch to reengage the feed-screw. When the bar C² is drawn rearwardly under the action of the spring C⁶ the member C⁷ operates to separate the contact-member B³ from the contact member B², thereby interrupting the electric circuit and stopping the motor.
 80
 85
 90
 95
 100
 105
 110
 115
 120
 125

It is noteworthy that the improved construction provides for the automatic return
 130

of the reproducer-carrier to its starting position by a very simple expedient, whereby the expense of the mechanism is greatly reduced, the durability of the machine is increased, and the certainty of action enhanced. The other features of improvement also enhance the durability of the machine and simplify the operation of the machine and the manipulation of its parts.

10 The foregoing detailed description has been given for clearness of understanding only, and no undue limitation is to be understood therefrom.

What I regard as new, and desire to secure by Letters Patent, is—

15 1. The combination with a phonograph having a record-carrier, a reproducer-carrier and a feed-screw for the reproducer-carrier, of a follower for said screw, a follower-retracting member, a spring tending to move
20 said follower-retracting member, latching-means for the follower-retracting member, a latch-releasing member actuated by the reproducer as the reproducer nears the end of its traverse, means for locking said latch-releasing member, and means carried by the
25 reproducer for releasing said latch-releasing member as the reproducer returns to its starting position.

30 2. The combination with a phonograph having a record-carrier, a reproducer-carrier and a feed-screw for the reproducer-carrier, of a follower for said screw, a rotary cam for retracting said follower, yielding
35 means tending to rotate said cam to retract said follower, locking-means for said rotary cam, a cam-equipped shiftable bar actuated by said reproducer and adapted to release said locking-means, means for locking said
40 bar in its shifted position, and means carried by the reproducer for releasing said last-named locking-means when the reproducer-carrier resumes its starting position.

45 3. The combination with a phonograph, of means for throwing the follower of the feed-screw into and out of engagement with the feed-screw, comprising a shiftable member actuated by the reproducer as it nears
50 one end of its traverse, a locking-member for said shiftable member, and adjustable means carried by the reproducer and serving to disengage said locking-member as the reproducer approaches the other end of its
55 traverse.

60 4. The combination with a reproducer-carrier of a phonograph and its feed-screw, of a rotary cam, a follower for said feed-screw retracted by said cam, a spring tending to rotate said cam, a shiftable bar
65 equipped with a cam actuated by the reproducer-carrier, an arm on the rotary cam adapted to be engaged by said bar to restore the cam to its normal position, and means for locking the cam in its normal position.

5. The combination with a reproducer-carrier of a phonograph and its feed-screw, of a rotary cam, a follower for said feed-screw retracted by said cam, a spring tending to rotate said cam, a latch connected
70 with said cam and engaging the reproducer-carrier, an arm connected with said cam, a shiftable bar adapted to be actuated by the reproducer-carrier and serving to release said latch in one position of the reproducer-carrier and to restore said cam to its normal
75 position in another position of the reproducer-carrier, means for locking said bar in its shifted position, and means carried by the reproducer for releasing said bar.

80 6. The combination with a phonograph having a record-carrier and a reproducer-carrier, of an electric motor serving to operate the phonograph, said motor having a switch, a feed-screw, a follower for the
85 feed-screw, a rotary cam serving to retract the feed-screw, the follower and the needle-holder of the reproducer, a latch adapted to lock said rotary cam, a shiftable bar actuated by the reproducer-carrier in one direction and serving to release said latch, a
90 spring serving to retract said shiftable bar, and circuit-controlling means controlled by said shiftable bar, for the purpose set forth.

7. The combination with a reproducer-carrier, its feed-screw, and a follower for the feed-screw, of a rotary cam serving to retract the follower, a spring tending to rotate said cam, a latch for said cam, a shiftable
100 bar serving to release said latch when shifted in one direction and to return said rotary cam to its normal position when shifted in the other direction, means on said bar and reproducer, whereby said bar is shifted in one direction, and a spring serving
105 to restore said bar to its normal position.

8. The combination with a reproducer-carrier of a phonograph and its feed-screw, of a rotary cam, a follower for said feed-screw retracted by said cam, a spring tending to rotate said cam, a latch connected
110 with said cam and engaging the reproducer-carrier, an arm connected with said cam, a shiftable bar adapted to be actuated by the reproducer-carrier and serving to release said latch in one position of the reproducer-carrier and to restore said cam to its normal
115 position in another position of the reproducer-carrier, means for locking said bar in its shifted position, and means carried by the reproducer for releasing said bar.

9. The combination with a phonograph having a record-carrier and a reproducer-carrier, of an electric motor serving to operate the phonograph, said motor having a
120 switch, a feed-screw, a follower for the feed-screw, a rotary cam serving to retract the feed-screw, the follower and the needle-holder of the reproducer, a latch adapted to lock said rotary cam, a shiftable bar actuated
125 by the reproducer-carrier, and means for locking the cam in its normal position, and means for releasing the cam from its normal position.

ated by the reproducer-carrier in one direction and serving to release said latch, a spring serving to retract said shiftable bar, and circuit-controlling means controlled by
5 said shiftable bar, for the purpose set forth.

10. The combination with a reproducer-carrier of a phonograph, of a bent tube-section having an arm swiveled on the horn of the reproducer-carrier, a bent tube-section

telescopically connected with said first-named 10 tube-section, a cup having swiveled connection with said second-named tube-section, and a tube-section removably connected with said cup.

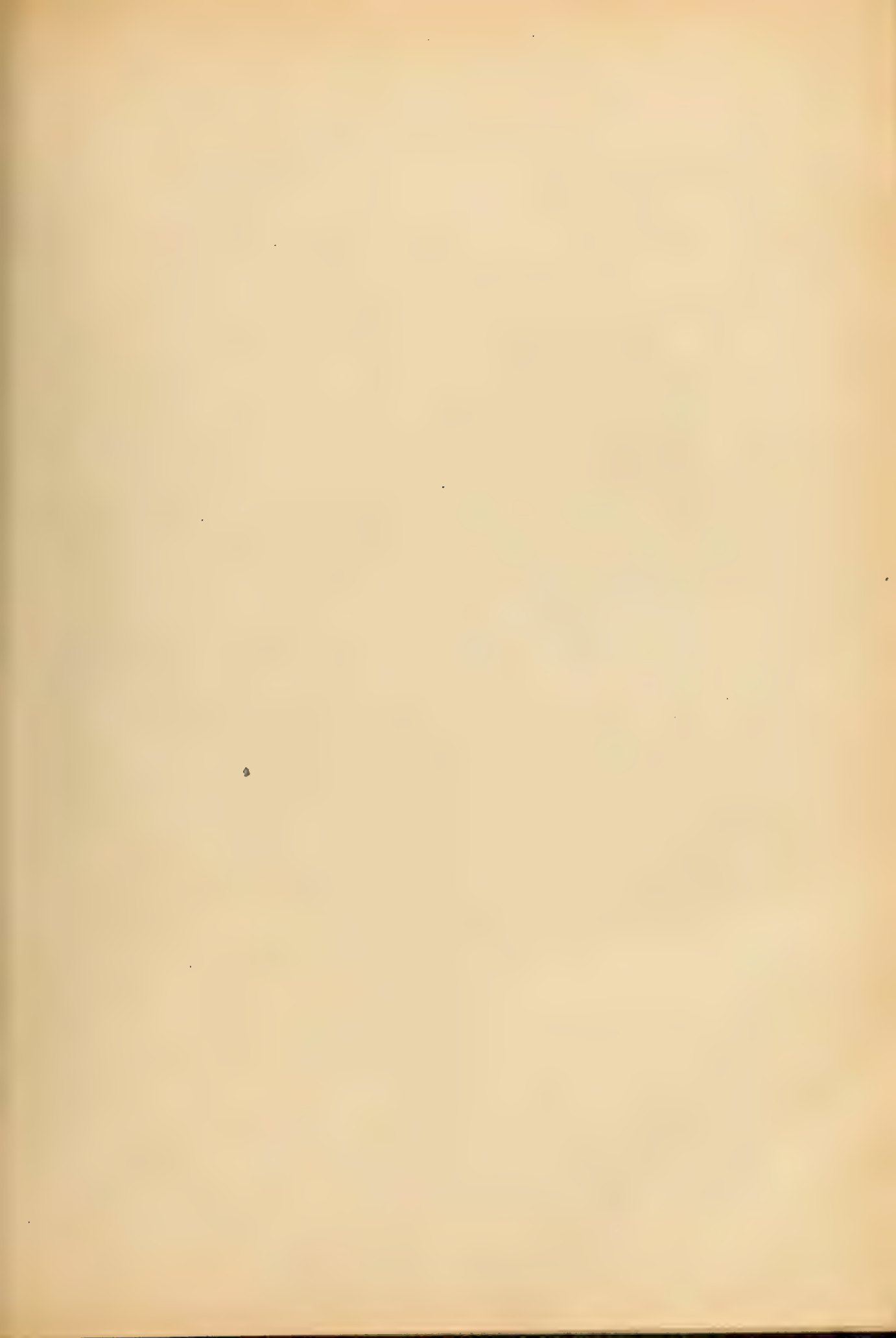
HERBERT S. MILLS.

In presence of—

RALPH SCHAEFER,

W. T. JONES.

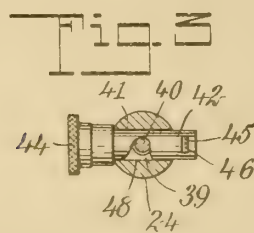
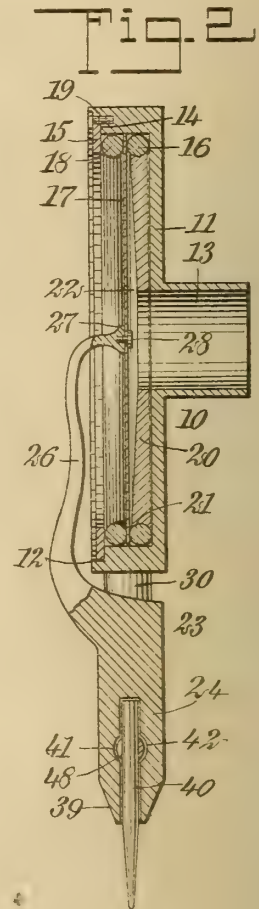
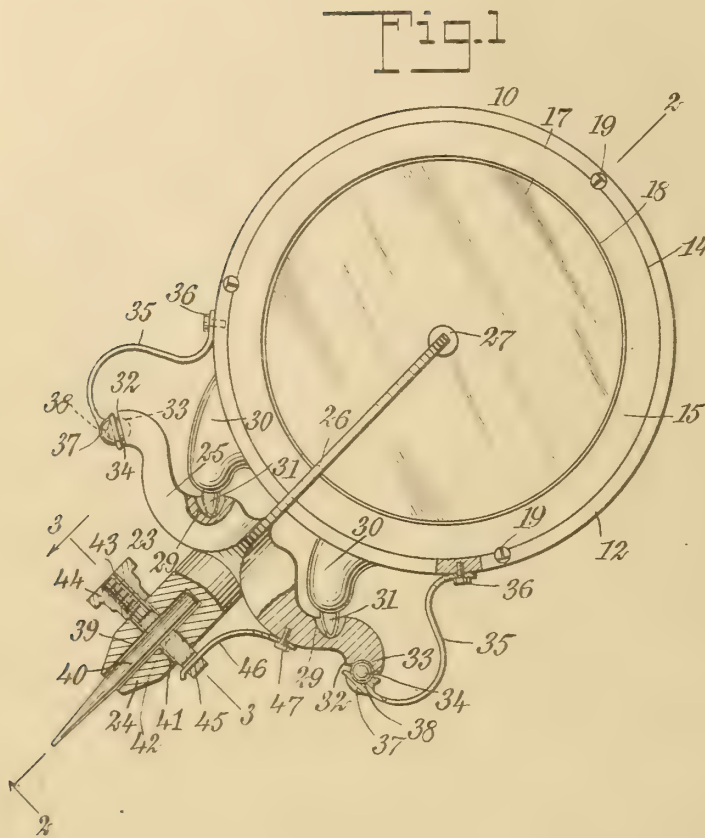




W. A. CHAPMAN.
SOUND BOX.
APPLICATION FILED OCT. 28, 1908.

943,339.

Patented Dec. 14, 1909.



WITNESSES
J. A. Brophy
John R. Bickel

INVENTOR
William A. Chapman
BY *Wm. A. Chapman*
ATTORNEYS

UNITED STATES PATENT OFFICE.

WILLIAM ALBERT CHAPMAN, OF SMITHVILLE, ARKANSAS.

SOUND-BOX.

943,339.

Specification of Letters Patent.

Patented Dec. 14, 1909.

Application filed October 28, 1908. Serial No. 459,887.

To all whom it may concern:

Be it known that I, WILLIAM ALBERT CHAPMAN, a citizen of the United States, and a resident of Smithville, in the county of Lawrence and State of Arkansas, have invented a new and Improved Sound-Box, of which the following is a full, clear, and exact description.

This invention relates to sound boxes for phonographs, talking machines and the like, and more particularly to devices of this class which include a casing, a diaphragm suitably mounted within the casing, a stylus bar controlling the diaphragm and having a yoke, means for resiliently holding the yoke with respect to the casing, and means for mounting the stylus bar, whereby the same can swing transversely of the plane of the diaphragm, and whereby the direction of pressure upon the bar, due to the weight of the box and the drag of the needle upon the record, is substantially vertical when the box is in the inclined, operative position, preferably at an angle of 45° with the horizontal.

The invention also includes means for removably attaching the needle point to the stylus bar and for mounting the diaphragm in the casing.

An object of the invention is to provide a simple, inexpensive and efficient sound box for reproducing or recording the sounds by means of records, employed in phonographs, talking machines and similar apparatus, by means of which the sounds can be reproduced with clearness and distinctness, and with all their original tonal qualities, and in which the relatively movable parts are not subjected to excessive wear.

A further object of the invention is to provide a device of the class described, which is so arranged that it can be employed at a normally operative angle of between 40 and 50° with respect to the horizontal, in which this inclination does not tend to distort or unnaturally strain the stylus bar, the means for mounting it and the diaphragm, and in which the parts are so connected that they automatically and resiliently adjust themselves to the various movements necessary in the reproduction and recording of sounds.

A still further object of the invention is to

provide a sound box in which the diaphragm is mounted in a suitable manner, having adjacent to the back, a back plate provided with a central opening and tapered inwardly to the opening, to permit the diaphragm to vibrate freely while the plate during certain vibrations presents its face substantially parallel to the adjacent face of the diaphragm, and in which the stylus bar has a recess adapted to receive the needle points and is provided with means for keeping the needle points in place so that they can be instantly attached or detached, without difficulty.

Another object of the invention is to provide a sound box in which the stylus bar is mounted to rock freely transversely of the plane of the diaphragm, on conical fulcrum points located in the line of the resistance to motion due to the weight of the box resting on the point of the needle, and the dragging of the needle on the record, and which is provided with auxiliary supports in the form of balls or rollers resiliently held in place on engaging seats provided therefor near the ends of laterally extended portions of the stylus bar, whereby is afforded a varying contact or frictional engagement as the bar rocks under the impulses communicated thereto by the needle in traversing the sound grooves of the record, in consequence of which the resilient positioning of the stylus bar automatically adjusts itself to the varying positions and movements of the parts.

The invention consists in the construction and combination of parts to be more fully described hereinafter and particularly set forth in the claims.

Reference is to be had to the accompanying drawings forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the views, and in which

Figure 1 is a front elevation of an embodiment of my invention having parts broken away and in cross section, and showing the same in the normal, inclined and operative position; Fig. 2 is a longitudinal section on the line 2-2 of Fig. 1; and Fig. 3 is a cross-section on the line 3-3 of Fig. 1.

Before proceeding to a more detailed description of my invention, it should be

clearly understood that while the same is particularly useful in connection with phonographs or talking machines employing disk records, it can also be advantageously applied to similar machines using cylinder or other records. Certain details of construction shown and described for example, herewith, form no part of my invention, but can be varied in accordance with individual preference or special conditions, without departing from the underlying spirit of the invention. For example, the nature of the diaphragm, the manner of attaching the stylus bar thereto, the means for connecting the sound box to the sound tube, and other details, can be altered as desired.

In the sound boxes in common use the stylus bar is mounted to rock transversely of the plane of the diaphragm and is movably supported by knife edges or fulcrum points, which lie in line or lines at substantially right angles to the length of the stylus bar. As the most efficient operative position of a sound box is at an angle to the horizontal, preferably an angle of 45° , the pressure due to the weight of the box upon the needle point causes an unequal or unbalanced strain on the fulcrum points or edges, as the upward pressure is at an angle with the line of engagement of the relatively movable parts. For instance, if the stylus bar is arranged to swing on two knife edges, one at each side of the bar, and both lying in a line at right angles to the bar, the weight of the sound box, when it is supported by the needle point upon the record and is at an angle with the horizontal, tends to force the bar into close engagement with the upper knife edge and to move it from engagement with the lower one, whereby a decided, unbalanced and torsional strain is produced. The pressure or resistance to gravitational action is upward, and therefore, I have found that the fulcrum points of contact should be so arranged that regardless of the inclination of the sound box the weight of the same causes an evenly distributed pressure upward on these points; that is, the bar should be mounted in such a manner that it can swing transversely of the plane of the diaphragm, while the direction of pressure upon the bar, due to the weight of the box, is substantially vertical when the box is in an inclined operative position.

With the manner of mounting the stylus bar used in the ordinary sound boxes, the inclination of the device when it is in operation necessitates the employment of strong resilient pressure to hold the stylus bar in position, and this pressure frequently interferes with the proper operation of the parts, and is usually disposed at some distance from the line of oscillation as a corrective

of the evil, which finds further expression at the center of the diaphragm, this being exhibited in a shifting of the diaphragm on its seat, placing one side under greater tension than the other, and in the enlargement of the central hole therein, and in the rupture of the connection with the stylus bar.

Referring more particularly to the drawings, I provide a casing 10 substantially cylindrical in form and having a back 11 and an annular rim 12. The back has the usual substantially central opening therethrough, surrounding which is a tubular extension 13 by means of which the box can be connected with the sound tube of the machine. At the inner edge, the rim 12 has an annular cut away portion or seat 14, adapted to receive an inwardly projecting annular member or retaining ring 15. A gasket 16, preferably of circular section, is arranged within the casing, adjacent to the rim and the back. The diaphragm 17 is positioned upon the gasket 16 and is held in place by a second gasket 18. The latter in turn is secured in place by the retaining ring 15. Screws 19 having the heads partly cut away and fitting in suitable openings of the rim, engage the retaining ring to secure it in place. By turning the screws so that the cut away parts of the head are inwardly disposed it is possible to withdraw the retaining ring to permit the diaphragm to be removed.

Inside of the diaphragm and adjacent to the back 11 of the casing is a back plate 20 having a central opening adapted to register with the opening of the back, and having a grooved periphery 21 in engagement at the inside of the gasket 16. The face 22 of the back plate, adjacent to the diaphragm is inwardly tapered toward its central opening so that the diaphragm can oscillate freely. When the diaphragm swings toward the back plate the inward taper of the same prevents any interference with the movement of the diaphragm, and at the same time this inward taper results therein that the face of the back plate is substantially parallel to the diaphragm face as the latter is distorted, and when swinging, assumes the shape of a flat cone.

I employ a stylus bar 23 having a lower cylindrical portion or barrel 24, at the upper end of which is located a stylus yoke or cross bar 25 preferably integral therewith. The stylus bar arm 26, rigid and preferably integral with the yoke, extends upwardly from the same and forms a continuation of the barrel. The upper end 27 of the arm is enlarged and engages with the diaphragm near the center of the same. A screw 28 or any other suitable means serves to attach the stylus arm to the diaphragm in the conventional manner.

At each side of the arm the yoke 25 has a tapered recess or seat 29, which receives a fulcrum point 31 carried by an extension 30 rigid with the casing of the box. The extensions are outwardly and laterally disposed as is shown most clearly in Fig. 1, and the points 31 are so formed that they extend at angles of substantially 45° with a line drawn from a point intermediate the points 31 to the center of the casing; that is, at angles of 45° with the length of the stylus bar. The tapered recesses 29 are similarly inclined at angles of 45° . Consequently, when the sound box is arranged in its operative position, which, too, is at an angle of preferably 45° with the horizontal, the pressure of the yoke against the fulcrum points is upward; that is, in a substantially vertical direction, owing to the inclination of the fulcrum points and the seats therefor with respect to the length of the stylus bar. It will of course, be understood that the angle of inclination and the angles which the fulcrum points make with the length of the stylus bar need not be exactly 45° , and these angles may be between 40 and 50° with substantially no difference in the operation and efficiency of the device. Hereafter, where I refer to this angle as being " 45° " it will be understood that this value is approximate, and may be varied somewhat with special conditions and under different circumstances.

The yoke 25 may be curved, for example as shown in the drawings, to render it artistic in appearance and at the same time to provide end faces 32, which are outwardly and downwardly disposed. The end faces have recesses forming seats 33 and adapted to receive spherical rollers or bearing balls 34. Substantially S-shaped resilient members or springs 35, are secured upon the sound box casing at opposite sides of the stylus bar and may be mounted in place by any suitable means, for example, by the use of screws 36. At the free ends, the keepers are enlarged to terminate in sockets 37 having recesses 38 which engage the balls 34. The springs thus serve to hold the stylus bar in place and to maintain the yoke in suitable movable engagement with the fulcrum points 31, to permit the bar to rock or oscillate freely, transversely of the plane of the diaphragm. The springs, owing to their form, cause an inward and upward pressure for maintaining the stylus bar operatively on position against the fulcrum points. The engagement of the spring keepers with the stylus bar is a movable one, owing to the provision of the ball and socket joints, and allows the parts to adjust themselves automatically to variations in pressure and position. The engagement engenders little friction and thus does not tend to interfere with the freedom of movement of

the stylus bar. The balls 34 may be fashioned from any suitable material preferably from glass or the like, though of course if so desired, they may consist of steel balls. The fulcrum points 31 may be of hardened steel but are preferably of some non-metallic substance such as agate or quartz. The back plate 20 is preferably too, of a non-metallic substance and is cemented in position. The recesses 29 may be lined with a suitable non-metallic substance similar to that forming the fulcrum points 31. The springs owing to their S-shape cause an inward and upward pressure.

The barrel has a longitudinal recess 39 therein and which is formed to receive the reproducing points or needles 40 of a recording tool. The barrel has a second opening therethrough and arranged transverse of the recess 39, and intersecting the same. A locking bolt or member 42 is movably arranged in the opening 41 and has a threaded end 43 upon which is mounted a thumb nut 44. The opposite end of the member 42 projects from the barrel and has an opening 45, in to which extends the end of a curved spring 46, the latter being secured in place upon the yoke by means of a screw 47 or in any other convenient manner. The member 42 has a notch 48 adapted to engage the shank of the needle to jam the same against the side of the recess 39 when the bolt is suitably positioned for this purpose by means of the jam nut 44. The cylindrical form of the nut permits the spring 46 to move the member 42 across the recess 39 so that the needle point can be easily withdrawn. A partial turn of the thumb nut which draws the member 42 along the opening 41 against the tension of the spring 46, instantly clamps in place in the barrel, a needle point, which engages the notch 48.

Having thus described my invention, I claim as new, and desire to secure by Letter Patent:

1. In a sound box, a diaphragm, a stylus bar controlling said diaphragm and having a yoke at substantially right angles thereto, and a fulcrum engaging said yoke, whereby said bar is mounted to swing transversely of the plane of said diaphragm, said fulcrum being at an acute angle with the direction of the length of said bar, said bar lying in a plane substantially parallel to that of said diaphragm.

2. In a sound box, a casing, a diaphragm therein, a stylus bar lying in a plane substantially parallel to that of said diaphragm, a fulcrum point at each side of said bar and rigid with said casing, said stylus bar having seats adapted to receive said points, said seats and said points having the direction of their lengths at angle of 45° with the

direction of the length of said bar, and resilient members engaging said stylus bar at both sides thereof to hold the same in engagement with said points, said points lying on a line at substantially right angles with the length of said bar.

3. In a sound box, a casing having rigid laterally inclined fulcrum points, a stylus bar intermediate said points and having a laterally extended yoke at substantially right angles to said bar and presenting seats adapted to receive said points, said seats being laterally inclined, a diaphragm in said casing, a stylus arm secured to said diaphragm and rigid with said stylus bar, and resilient members engaging said stylus bar whereby an inward and upward pressure is exerted thereagainst, said bar lying in a plane substantially parallel to that of said diaphragm.

4. In a sound box, a casing, a stylus bar pivotally carried by said casing, a diaphragm within said casing and controlled by said stylus bar, a resilient keeper carried by said casing, and a member loosely positioned between said keeper and said stylus bar and engaging both of the same.

5. In a sound box, a casing, a diaphragm therein, a stylus bar pivoted upon said casing and having lateral extensions, spring keepers carried by said casing and each having an end adjacent to the end of one of said extensions, and rollers between said extensions and said keepers and engaging the same whereby said stylus bar is loosely held in place.

6. In a sound box, a casing, a diaphragm therein, laterally inclined fulcrum points rigid with said casing, a stylus bar having a transverse yoke and a stylus arm rigid therewith, said arm controlling said diaphragm, said yoke having seats adapted to receive said points, said yoke at the ends having further seats, spring keepers mounted upon said casing and terminating in sockets, each adjacent to one of said further seats of said yoke, and a roller in each of said further seats and in engagement with one of said sockets.

7. In a sound box, a casing, a diaphragm within said casing, and a stylus bar controlling said diaphragm, said casing at the back of said diaphragm having a plate tapered to a point substantially opposite the center of said diaphragm.

8. In a sound box, a casing having a back, a diaphragm within said casing, rings for mounting said diaphragm in place, and a stylus bar controlling said diaphragm, said casing at the back having a plate tapered from the periphery toward the center, said plate and said casing having registering openings.

9. In a sound box, a casing having a back,

a gasket within said casing adjacent to said back, a diaphragm on said gasket, means for holding said diaphragm in position upon said gasket, and a back plate between said back and said diaphragm and tapered from the periphery toward the center.

10. In a sound box, a casing having a back provided with a central opening, a gasket within said casing adjacent to said back, a diaphragm on said gasket, a second gasket on said diaphragm, means for holding said second gasket in position, and a back plate secured to said back and engaging said first gasket at the inside thereof, said back plate having an opening registering with said first opening and being tapered from the periphery to said opening.

11. In a sound box, a stylus bar having a barrel provided with an opening, a longitudinal recess adapted to receive a needle point, said barrel having a transverse opening intersecting said recess, a locking bolt movable in said transverse opening and having a projecting threaded portion, a nut upon said threaded portion, said locking bolt having a notch adapted to engage a needle point, and a resilient member engaging said locking bolt at the end remote from said notch and tending to move said bolt longitudinally of said opening.

12. In a sound box, a casing, a diaphragm therein, rigid, laterally extending fulcrum points carried by said casing and disposed in the plane of the diaphragm, a stylus bar intermediate said points and having a laterally extending yoke provided with a face transverse of the length of said stylus bar, said face being provided with seats adapted to receive said points, said seats being laterally inclined in directions diagonal to that of the length of said stylus bar, and resilient members engaging said yoke, whereby an inward and upward pressure is exerted thereagainst, the face of said yoke lying in a plane transverse to the length of said stylus bar, said bar lying in a plane substantially parallel to that of said diaphragm.

13. In a sound box, a diaphragm, a stylus bar controlling said diaphragm and having a yoke at substantially right angles thereto, and a radially extending fulcrum engaging said yoke at a face thereof transverse to said bar, whereby said bar is mounted to swing transversely of the plane of said diaphragm, said fulcrum lying in the plane of said diaphragm and at an angle with the directions of the lengths of said yoke and said bar, said bar being in a plane substantially parallel to that of said diaphragm.

14. In a sound box, a casing, a diaphragm therein, a stylus bar controlling said diaphragm, a radially directed fulcrum point at each side of said stylus bar and rigid with

said casing, a stylus bar having a yoke, and
seats therein adapted to receive said points,
said seats and said points having the direc-
5 tions of their lengths radially disposed at an
angle of 45° with the length of said bar, and
movable members engaging at the ends of
said yoke, and a resilient member engaging
each of said members at the ends of said
10 yoke, to hold the same in engagement with
said yoke, and to hold said yoke in engage-

ment with said points, said points lying in a
line at substantially right angles to the
lengths of said bar.

In testimony whereof I have signed my
name to this specification in the presence of 15
two subscribing witnesses.

WILLIAM ALBERT CHAPMAN.

Witnesses:

H. C. STEADMAN,

J. E. MOORE.





W. C. RUNGE.
 MANDREL FOR PHONOGRAPH RECORDS.
 APPLICATION FILED APR. 21, 1909.

943,568.

Patented Dec. 14, 1909.

Fig. 1.

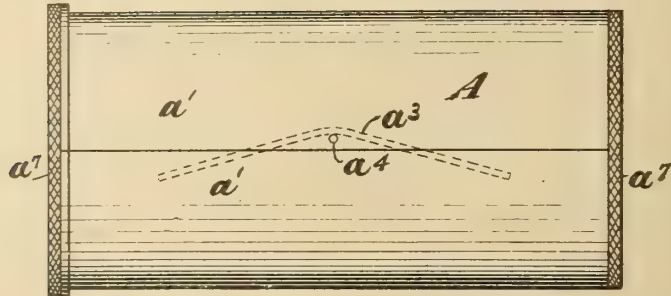


Fig. 2.

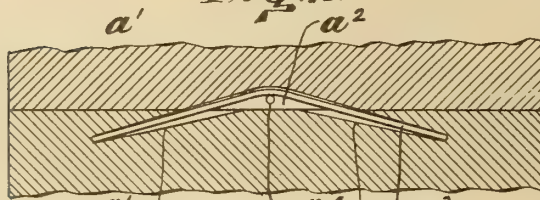


Fig. 3.

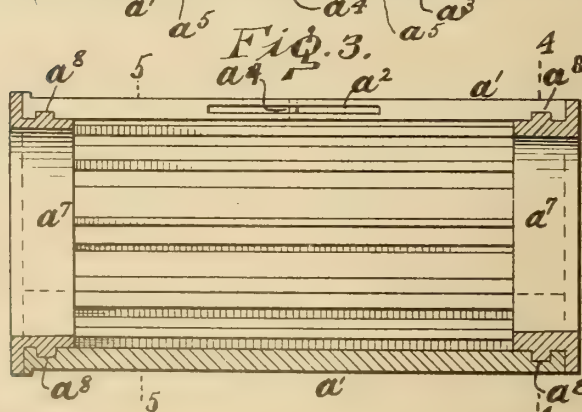


Fig. 4.

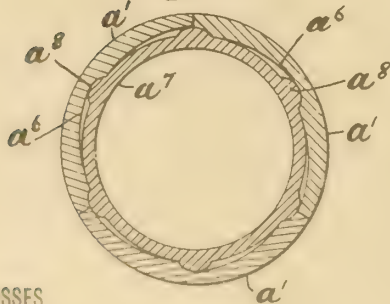
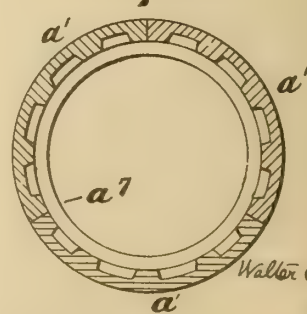


Fig. 5.



WITNESSES

May 2, 1910
 Frank E. Stephens

Walter C. Runge
 INVENTOR

BY Dickerson Brown Riegner & Maltz

HIS ATTORNEYS

UNITED STATES PATENT OFFICE.

WALTER C. RUNGE, OF CAMDEN, NEW JERSEY, ASSIGNOR TO ROYAL PHONE AND PHONOGRAM COMPANY, OF BOSTON, MASSACHUSETTS, A CORPORATION OF MAINE.

MANDREL FOR PHONOGRAPH-RECORDS.

943,568.

Specification of Letters Patent.

Patented Dec. 14, 1909.

Application filed April 21, 1909. Serial No. 491,224.

To all whom it may concern:

Be it known that I, WALTER C. RUNGE, a citizen of the United States, and a resident of Camden, county of Camden, and State of New Jersey, have invented certain new and useful Improvements in Mandrels for Phonograph-Records, of which the following is a specification.

Some phonographs are provided with tubular mandrels which may be slipped on and off the arbor of a phonograph and have phonograph records tubularly engaged with them.

My invention relates to such a mandrel made capable of expanding and contracting for the purpose of respectively securing and releasing a phonograph record.

In the accompanying drawings: Figure 1 is a side view of a mandrel embodying my improvement. Fig. 2 is a section through a portion of the circumference to illustrate the means of connecting segments which are comprised in the mandrel. Fig. 3 is a central longitudinal section of the mandrel. Fig. 4 is a transverse section of a mandrel taken at the plane of the line 4—4 in Fig. 3. Fig. 5 is a transverse section of a mandrel taken at the plane of the line 5—5 in Fig. 3.

Similar letters of reference designate corresponding parts in all the figures.

A designates the body of the mandrel. It is of tubular form and made of a number of longitudinal segment shaped sections a^1 . While these sections may be of any desired number, I have only shown three in this example of my invention, each of the three forming a third of the body. The sections of the body are connected together at their longitudinal edges and in such a manner that they may yield independently so that the body as a whole may expand and contract. As here shown, a groove a^2 is formed in one of the longitudinal edges of each section a^1 and in this groove a spring a^3 is introduced. This spring consists of a strip of resilient metal and is bent longitudinally

into bow shape. Its middle portion fits in the groove a^2 and is retained there by a pin a^4 which extends transversely through the groove. The ends of the spring a^3 protrude into cavities a^5 formed in the opposite edge of an adjacent section a^1 and extending obliquely therein. The sections a^1 near their ends, are provided with a number of arc shaped grooves a^6 which are eccentric to the axis of the exterior of the mandrel body. Inside the end portions of these sections rings a^7 are inserted and these are provided externally with bosses or projections a^8 which extend into the arc shape grooves a^6 formed in the end portions of the sections a^1 of the mandrel body. The engagement of these bosses a^8 with the grooves a^6 keeps the rings a^7 in place lengthwise of the mandrel body. Preferably the grooves a^6 will be flared in reverse directions at the two ends of the sections a^1 of the mandrel body so that if the rings a^7 are turned in opposite directions, the mandrel body will be expanded at both ends.

What I claim is:—

1. A phonograph record mandrel having in combination an expansible tubular body composed of longitudinal segments having cam shaped surfaces in their interiors, and means at the ends of the body for coacting with said cam shaped surfaces.

2. A phonograph record mandrel having in combination an expansible tubular body composed of longitudinal segments having cam shaped surfaces in their interiors, and rings at the ends of the body provided with means for coacting with said cam shaped surfaces.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

WALTER C. RUNGE

Witnesses:

FRANK E. RAUFMAN,
PAUL H. FRANK.

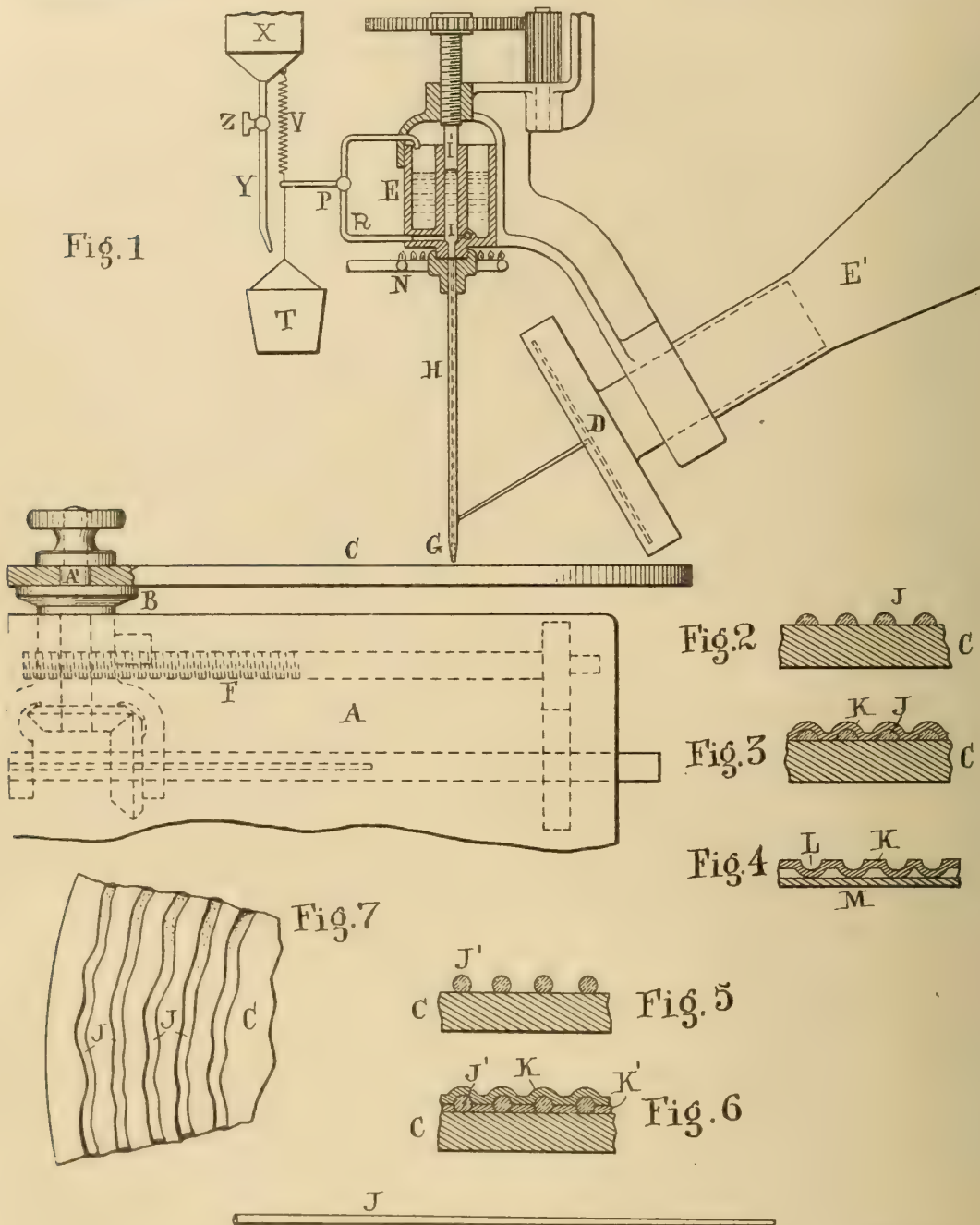




R. L. GIBSON.
MANUFACTURE OF RECORDS FOR SOUND REPRODUCING MACHINES.
APPLICATION FILED AUG. 17, 1907.

943,631.

Patented Dec. 14, 1909.



Witnesses
Daniel Webster, Jr.
M. F. Driscoll.

Inventor
Robert L. Gibson
By *[Signature]*
Attorney

UNITED STATES PATENT OFFICE.

ROBERT L. GIBSON, OF PHILADELPHIA, PENNSYLVANIA.

MANUFACTURE OF RECORDS FOR SOUND-REPRODUCING MACHINES.

943,631.

Specification of Letters Patent.

Patented Dec. 14, 1909.

Original application filed June 14, 1907, Serial No 379,712. Divided and this application filed August 17, 1907. Serial No. 398,001.

To all whom it may concern:

Be it known that I, ROBERT L. GIBSON, of the city and county of Philadelphia and State of Pennsylvania, have invented an Improvement in the Manufacture of Records for Sound-Reproducing Machines, of which the following is a specification.

My invention has reference to the manufacture of records for sound reproducing machines, and consists of certain improvements which are fully set forth in the following specification and shown in the accompanying drawings, which form a part thereof.

This application is a division of my application, Serial No. 379,712, filed June 14, 1907.

Heretofore, in the manufacture of gramophone records, namely, those of disk form having a spiral groove in their face for operating a stylus of the sound box, two general methods of manufacture have been employed. The first of these relied upon the etching process, and consisted essentially of floating upon the surface of a polished disk of zinc a thin greasy or waxy coating, such as may be produced by a wax dissolved in alcohol or other solvent, and after subjecting the surface so produced to the stylus of a recording machine vibrated in accordance with sound waves whereby the spiral tracing so formed will expose the zinc, etching the exposed surface to form a spiral groove having lateral undulations which correspond to the tracing of the stylus. The etched disk so produced is then cleaned and subjected to an electroplating operation, such as employed in electrotyping, and an inverse matrix is produced which, after being backed to strengthen it, may be subsequently employed as a die from which to impress in hard rubber or equivalent compounds a record groove which may be used in the reproducing machine, such as the ordinary gramophone. In this manner, duplicates from the master record may be employed in reproducing the sound waves. Great objection, however, has always resulted from the fact that in any etching process, the lateral walls are under-cut owing to the fact that the acid eats laterally as well as vertically, and consequently the records produced under this process have not been considered satisfactory, and the process has been super-

seded. The second process, and which is that commonly employed at the present time, comprises the following steps: A disk is coated with a waxy compound, such as metallic soap, capable of being engraved, and after being carefully smoothed and leveled, the stylus of the recorder acting as an engraving tool is caused, through the rotation of the disk, to engrave a spiral groove therein of even depth and with lateral undulating side walls. This engraved disk is then dusted with plumbago and subjected to an electroplating process by which a matrix is produced having a raised spiral upon its surface; the said master matrix after being backed and strengthened is in a form capable of being used as a die for reproducing in suitable earthy compounds resembling hard rubber, duplicate records suitable for use in connection with the reproducing machine, such as the ordinary gramophone. Ordinarily, this master matrix in copper, secured by the electroplating process, is not employed as the die because it would soon wear out, and as there would be then no way of securing an accurate duplicate (since the wax engraved disk would have been injured or destroyed), it has been customary after producing the first matrix in copper to employ the same to impress one or more additional wax tablets with the spiral groove lines and to produce "dubbed" matrices from these wax impressions by further electroplating, the "dubbed" matrices so produced being then employed as the dies in the duplicating processes employed later on in the commercial manufacture.

In the first process above mentioned, in which etching was employed it has also been customary to "dub" the matrix as desirable results would not be secured by attempting to use the zinc disk after etching more than in the first instance. In such case, the copper matrix produced from the zinc was employed to produce duplicate dies by "dubbing" operations in which the die was impressed in wax surfaces which were subsequently electroplated, thereby multiplying the defects. In no case in these prior methods has the copper matrix, produced from the engraved or etched disk, been capable of use with a gramophone instrument, as they did not have embodied in their construction a groove to receive the stylus. Moreover,

the "dubbing" operations, which have usually been employed, introduced undesirable defects and multiplies existing defects which may have been inherent in the original matrix, into the commercial records which are produced from the "dubbed" dies, and this is important because the very slightest irregularity in the grooves will produce marked defects in the reproduction of sound, as is well known to those skilled in the art.

The object of my invention is to overcome the existing objections in the manufacture of commercial records and to produce records in a commercial manner and form which shall be more accurate in their reproductions.

Generally stated, my invention comprehends a record tablet produced by the following process: A polished surface of a rotating disk has a line-like layer of a substance of a plastic or fluid condition fed upon it through a stylus kept in a state of vibration by the recording diaphragm of a recording machine, the layer being received upon the plate in the form of a spiral and in such a manner that it has undulations corresponding to the sound waves. This substance may be forced through the stylus under great pressure, if so desired. The spiral layer thus deposited upon the surface of the disk is then employed with the disk as a mold or form upon which an electrodeposition of copper is made, the copper bridging over the spiral layer. When the proper thickness of copper is provided, it is then stripped from the disk in the form of a sheet and such of the spiral layer as may adhere to the copper sheet is removed by suitable solutions, and the copper record so made forms a permanent master record. This metal record is a disk with a spiral groove in its surface which is in the most perfect form for reproducing sound by use of a gramophone instrument. As it is the original grooved copper record and as the recorded spiral has been destroyed, it is not advisable to use this master record as a matrix or die, and I therefore produce an electroplated disk which is a matrix in the form of a die by plating copper, nickel or other metal upon the surface of this grooved metal record, producing thereby a matrix with a raised spiral corresponding to the original disk with the recorded spiral laid thereon. This matrix so produced may be stripped from the original grooved copper record, and, after being backed, it may be employed as a die from which to make duplicate record tablets in suitable earthy composition resembling hard rubber, which may be directly employed in connection with the reproducing gramophone instrument.

Where the primary spiral was laid upon the revolving disk of a material which was

sufficiently hard to withstand reasonable pressure, the original disk so prepared may be employed to directly take an impression of the sound record in a wax surface, and this may be electroplated similarly to electrotyping, and the dies so produced employed for reproducing in earthy composition resembling hard rubber, as above. However, as in this case there is danger of the original record becoming destroyed by repeated use, it is preferable to produce an electroplated master record from which future dies may be reproduced, and this would be preferably done by preparing a copper reverse with the spiral groove by electroplating and employing said grooved metal master record for preparing any number of dies from which to make the commercial record tablets in earthy or hard-rubber-like compositions.

In case the spiral layer, laid upon the revolving disk under the action of the recorder, should be of rope-like form, that is to say, its sides having under-cut portions adjacent to the metallic disk, then in that event, it is customary to electroplate the record tablets so produced until there is a deposition of copper upon the plate and around the spiral rope-like layer to the depth approximately to the middle of the rope-like layer, and then by interrupting the deposition and allowing the surface to become oxidized or coated with a solution of poor conductivity, and repeating the electroplating operation until the entire surface including the rope-like portions are covered with copper, the outer or upper layer of deposited copper may be stripped from the first or lower layer and after being flattened and suitably backed be employed as the grooved master metal record in the manner hereinbefore referred to. It is also evident that the lower layer of the deposited copper, coupled with the disk, will form a grooved master metal record which may also be employed when cleared of the rope-like material, as a master metal record from which to make the dies. In this case the spiral would run from left to right instead of right to left, and the turn-table with the record disk would have to be rotated in reverse direction. It will be seen that in the manufacture of grooved record disks in this manner, the grooves will be very smooth since they partake of the smoothness of the rope-like or other layer deposited by the recording stylus. The result of this smoothness is the elimination of scratchy sounds in the reproduction of music or words by the gramophone instrument and which scratchy sounds so objectionably dominate reproductions from record tablets made by the processes first above referred to employing etching and engraving as the preliminary operations. Another feature of my invention is the

production of a record groove which is wider as we approach those portions of the spiral of smaller diameter; and this is important because of the more blunt character of the stylus point of the reproducer, because of wear, when it reaches those portions of the spiral disposed more nearly toward the center of the disk. The production of this widening of the groove in a gradual manner is the result of causing the material by which the deposited spiral is made to be forced through the stylus point at a fixed rate and by the natural gradual changing of the surface speed of the disk at the point of deposition of the material. This will be understood from the fact that where the rotation of the disk is uniform, the spirals at those portions of the disk of greater diameter are naturally longer than those portions of the spiral adjacent to portions of the disk of less diameter, as each of such spirals is produced in the same time, it is evident that more material is deposited per linear inch upon the spirals of smaller diameter than upon the spirals of larger diameter, and hence will flatten out to a wider condition with the smaller spirals than with the larger. The metal record subsequently produced from this master pattern will take on the same properties. The same results may be obtained by regulating the flow of the material when the speed of the disk is uniform or varying as desired.

My invention also comprehends details which, together with the features above specified, will be better understood by reference to the drawings, in which:—

Figure 1 is an elevation illustrating diagrammatically the manner of depositing the spirals of the deposited material in the operation of a recording instrument; Fig. 2 is a cross section of a portion of the prepared master pattern; Fig. 3 is a similar cross section after the deposition of the copper preliminary to stripping; Fig. 4 is a cross section of the stripped matrix suitably backed; Fig. 5 is a cross section corresponding to Fig. 2 but in which the deposited material is in rope-like form; Fig. 6 is a similar cross section showing the manner of depositing the copper thereon in the production of the metal record; Fig. 7 is a plan view of a portion of the master record before electroplating; and Fig. 8 is a cross section of a portion of a die produced from the metal record.

A is the motor mechanism of a gramophone recording machine and while rotating the turn table B also causes the sound box D to be traversed radially of the turn table by the mechanical feed screw E. The sounds to be recorded are delivered into the bell mouthed receiver E'.

G is a stylus which is supported in a vertical position and connected to the dia-

phragm of the sound box so as to be vibrated thereby. This stylus is made like a tube with an exceedingly small orifice at the bottom. The point of the stylus is held slightly above and out of contact with the metal disk C which is supported upon the turn-table or spindle A' of the motor A. The upper end of the stylus G may communicate with a reservoir I for fluid by a flexible tube H of any suitable character. The reservoir may be an open receptacle or may be in the form of a cylinder and plunger like a hydraulic ram as indicated at I' where the fluid is dense. By applying great pressure the material being forced through the stylus may be quite thick or dense. Where a more fluid material is employed, it may be incorporated with a volatile solvent so that when laid upon the disk it will quickly set and harden. Substances from which the raised line may be formed may consist of a mixture of equal parts of carmaluba wax, shellac wax and tallow, or refined asphaltum, as examples. In the apparatus shown, the plunger I' moving at a fixed speed will produce a given constant flow at the stylus. To make this flow a minimum the valve P in the escape pipe R from the reservoir allows a maximum escape into a vessel E of the material of which the reservoir is charged. As the operation progresses the valve is gradually turned mechanically or otherwise so as to reduce the escape of material into the vessel E. This valve may be closed gradually by a weight T which may be in the form of a bucket supported by a spring V and gradually increased in weight by the dropping of water or other fluid from a tank X through a nozzle Y controlled by a valve Z. In this way the gradual lowering of the weighted bucket turns the valve P and in turn gradually restricts the escape of the material with the result of more of it being forced through the stylus upon the rotating disk to thicken the line of deposit. If desired, heat may be applied to the material during the above operation by a burner N or otherwise, as found most convenient. Any other type of apparatus may be employed for laying a thin stream of material upon the recording surface. It will now be understood that as the recording disk C is being rotated the stylus G is caused to deposit upon its surface a spiral layer of material J which if of a fluid consistency will set in the form indicated at J in Fig. 2, but if of a more solid consistency will retain a rope-like form as indicated at J' in Fig. 5.

As the deposition of this layer is accomplished without practical resistance to the vibrations of the diaphragm it is evident that the lateral undulations of the layer will conform very accurately to the sound vibrations. It is also evident that the amplitude

of these sinuosities or lateral undulations may be magnified to any degree desired by simply adapting the leverage of the stylus to meet the requirements.

After the master record is made as indicated in Fig. 2, it is coated with a layer of copper electrically deposited, first under very low voltage and later under higher voltage. If the disk C be of metal, the copper will be deposited between the spirals J and gradually build up over them as indicated in Fig. 3. After sufficient copper is deposited, it is stripped from the disk and after being flattened is backed by a backing plate M sweated on as indicated in Fig. 4. The matrix so produced will have a spiral groove in its surface as at L and this groove will be exceeding smooth and accurate to the sound waves which dictated its sinuosities. This matrix may be used to reproduce sounds or it may be employed from which to make dies (reverse) by electroplating as indicated at Fig. 8 which may be used for duplicating the records in compounds resembling hard rubber or other suitable substances.

As before explained, the speed of the disk C on the recorder being uniform the surface speed under the stylus point will be gradually reduced as the recording proceeds so that if the fluid is forced through the stylus at a fixed rate the deposited material J will be of gradually increasing width so that the ultimate groove L will likewise be of gradually increased width from the beginning to the end of the spiral; but so slight and gradual is this change that it is hardly perceptible to the eye. This change in the size of the groove enables the style or needle of the reproducer to more perfectly cooperate with the groove and compensate for the wearing away of its point. If the deposited material is in rope-like form as indicated at J' then the electroplated matrix K can not be directly made because of the under-cut portions. The copper deposit is performed in two operations, as follows: The first deposit is indicated at K' in Fig. 6 and extends up to the largest diameter of the material J'; the disk so prepared is then removed from the plating bath and the surface of the copper allowed to oxidize or rubbed with a solution such as alcohol and oil to deaden the metallic surface slightly, after which the disk is put back in the bath and the second deposit K made to completely cover the rope-like portions J'. This latter deposit K may then be readily stripped from the part K' and backed as before described and illustrated in Fig. 1. It will also be seen that the plate with the part K' will likewise constitute a record tablet which will reproduce the original sounds.

While it is not necessary that the substance of which the parts J and J' are formed shall

be conducive of electricity they may be so formed or may be subsequently, and before plating, coated with plumbago as in electroplating. As before pointed out, the parts J J' may be so hard when dried that they, in conjunction with the disk C may be used as the matrix or master die for dubbing in wax in the making of a copper duplicate for subsequent use in duplicating the record tablets.

Among the great advantages of my improved method of making matrix dies for the manufacture of commercial records may be stated first,—the form of the undulations are more accurate conformations to the sound waves than by engraving or etching; second,—the groove in the commercial record tablet is very smooth and eliminates scratchy sounds, thus insuring pure reproduction; third,—the master die for reproducing may be made economically without “dubbing” and its incidental defects; fourth,—the master grooved record matrix is in copper and hence durable; fifth,—defects introduced by coating the record with graphite employed in engraved wax records are prevented; sixth,—the record groove may have any magnitude of relative lateral undulations or sinuosities desired for any fixed sound so that the reproduced sound may be louder and more distinct than the original sounds; seventh,—the record groove may be of gradually increasing width (and depth if desired) from beginning to end of the record to suit the gradual blunting of the stylus point; eighth,—the durability of the record is increased because it, being formed without material resistance to the sound waves, will have more gradual curves in the sinuosities and the width of groove being gradually widened prevents excessive friction between the stylus point and record; and ninth,—the tone of reproduction will be purer and more accurate than where etched or engraved records are employed.

In all cases where the electro-deposition is made upon a surface coated with plumbago, such as now in general use, the plating is in copper because a metal harder than copper, such as nickel, will not adhere sufficiently to prevent the curling tendency of the harder metal, but in the case of my invention I first produce my master record in copper and may then directly make my dies from it in nickel backed with copper—thereby producing the strongest character of die without any interposed “dubbing” operations.

While I prefer the making of the groove of gradually increasing width it is evident that it may be made of the same width by simply increasing the speed of rotation of the turn-table or disk C so as to keep the surface speed of the latter relative to the stylus the same throughout the laying of the

part J or J'. Devices suitable for such purpose are set out in my application Serial No. 372,432, filed May 7th, 1907. Or, instead of increasing the speed of the disk C, it may remain at same speed and the pressure on the material in the reservoir I may be gradually decreased, in which case a gradually lessened quantity of material will leave the stylus with each successive rotation of the disk C.

By my improved manner of making a sound record, it is evident that instead of incorporating into the electroplated surface of the groove a texture corresponding to the irregularities of an engraved surface in wax, of which it is a counterpart, I am enabled to produce a groove by electroplating and whose surface has a texture which is the counterpart or inverse of a surface texture of a congealed deposited fluid such as a compound capable of being made to flow by heat and pressure and set by cooling, and which has not been disturbed by any objectionable engraving or abrading operations. The surface texture of the groove of my record is, therefore, exceedingly smooth and reproduces without the objectionable sounds which are inherent to all records which are made from engraved or etched surfaces.

I have described my improvements in a manner to indicate my preferred way of employing them for commercial reproduction of record tablets, but I do not confine myself to the details either as to composition of the layers J, J' or of the materials of which the electro-deposited matrix is composed since it may be of other metal than copper; neither do I restrict myself to the manner of causing a separation between the parts K K' of the electro-deposited metal layers.

In this application I do not claim the apparatus for the manufacture of the master pattern, nor do I claim the method of manufacturing the master pattern, or master record, as these form subject matter of my original application, Ser. No. 379,712 filed June 14, 1907 hereinbefore mentioned, and of which this application is a division.

I also wish it to be understood that while I have described my invention with special reference to the making of disk records, I do not confine myself thereto as my invention may be employed to the making of any type of record where a grooved surface is required.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is:—

1. As a new article of manufacture, an original metal master sound record formed

of an electroplated disk with a record groove.

2. As an article of manufacture, a metallic sound record tablet in which the record groove is of increasing cross section throughout its length.

3. As an article of manufacture, a sound record tablet in which the record groove is of increasing width throughout its length.

4. As an article of manufacture, a sound record tablet in which the record groove is in spiral form of even depth and laterally undulating and of increasing width throughout its length.

5. A master record having a sound groove of increasing width throughout its length.

6. A master pattern having a raised ridge-like irregular line corresponding to sound waves and having a cross section increasing throughout its length.

7. As a new article of manufacture, an original metal master sound record consisting of an electroplated disk having a laterally undulating groove of a width at any point in its length greater than the width of the groove from said point to one end thereof and less than the width of the groove from said point to the other end thereof.

8. As a new article of manufacture, an original metal master sound record consisting of a disk formed of an electroplated mass having a laterally undulating groove of a cross section widest at the top and of a depth slightly less than its width and in which the width at any point in its length is greater than the width of the said groove between said point and one end thereof.

9. As a new article of manufacture, an original master sound record formed of an electroplated disk with a record groove whose surface has an inverse texture to that of a plumbago coated surface of a congealed deposited fluid as distinguished from an engraved or etched surface.

10. A master pattern consisting of a flat plate and having formed thereon a spirally arranged raised ridge-like laterally undulating line corresponding to sound waves and formed of a deposited wax-like material adhering to the plate widest at the bottom adjacent to the plate and rounded at the top and having a cross section corresponding to the cross section of the finished sound record groove in the record tablet to be made from said master pattern.

In testimony of which invention, I have hereunto set my hand.

ROBERT L. GIBSON.

Witnesses:

R. M. HUNTER,
M. F. DRISCOLL.



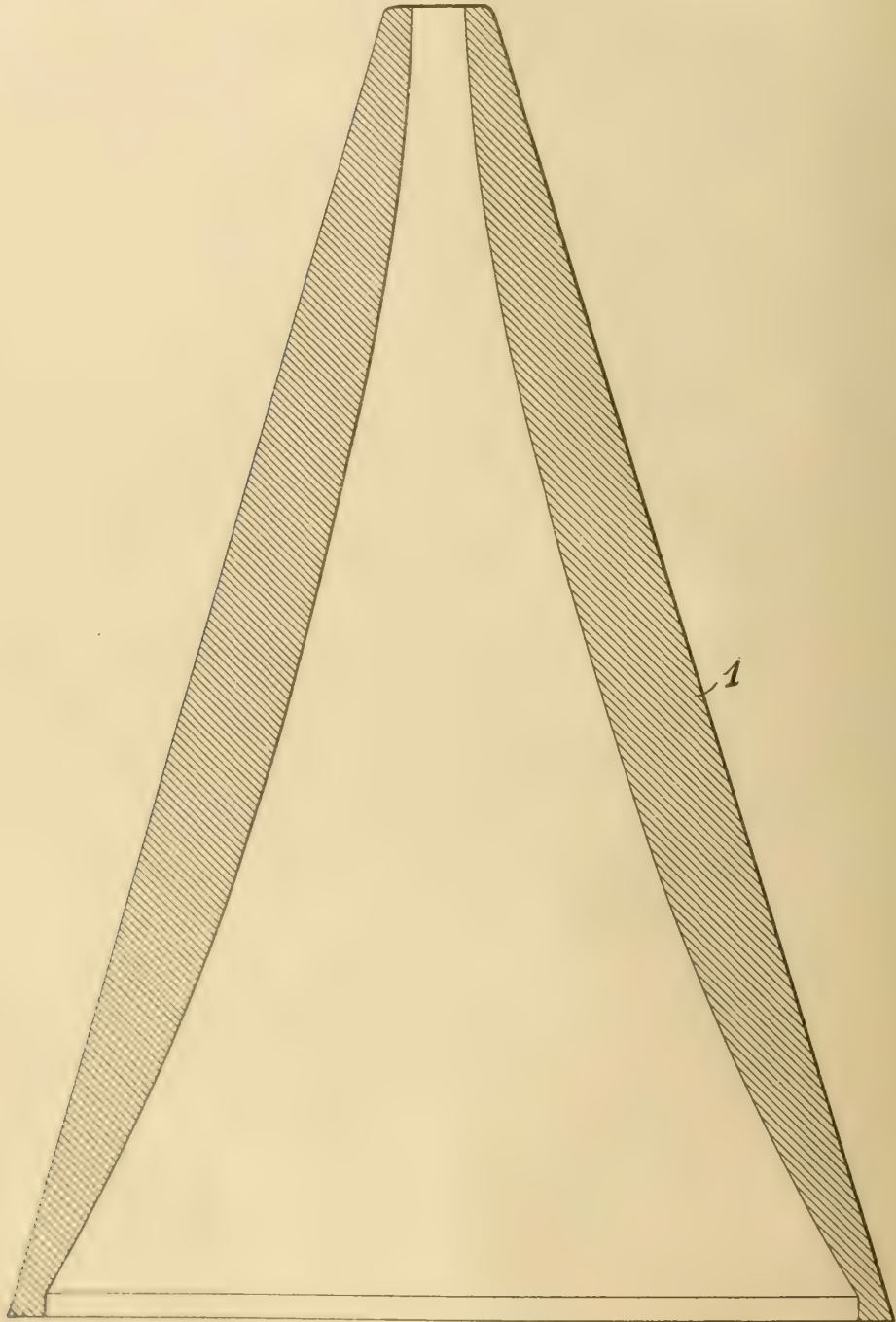
T. A. EDISON.

HORN FOR TALKING MACHINES.

APPLICATION FILED MAY 24, 1905. RENEWED JUNE 10, 1909.

943.663.

Patented Dec. 21, 1909.



Attest:
Edgeworth Mason
Mason C. Mason, Attorney

Inventor:
Thomas A Edison
by *Grand L. Spence* Att'y

UNITED STATES PATENT OFFICE.

THOMAS A. EDISON, OF LLEWELLYN PARK, ORANGE, NEW JERSEY.

HORN FOR TALKING-MACHINES.

943,663.

Specification of Letters Patent.

Patented Dec. 21, 1909.

Application filed May 24, 1905, Serial No. 261,951. Renewed June 10, 1909. Serial No. 501,413.

To all whom it may concern:

Be it known that I, THOMAS ALVA EDISON, a citizen of the United States, residing at Llewellyn Park, Orange, in the county of

pathetic tones, due to its walls vibrating, and which absorbs scarcely any energy from the sound waves by having its mass set in vibration.

Reference is hereby made to the accompanying drawing which shows in axial section a funnel constructed in accordance with my invention. It will be observed that the wall or walls 1 of the funnel are of maximum thickness at a point between its ends and that the thickness decreases gradually toward each end so that a section thereof is in outline the form of an ordinary truss.

I prefer to make the funnel of plaster-of-paris, since it may be readily cast, but obviously, other suitable materials may be made use of. The funnel is supported in any suitable way, and connection with the recording mechanism is made preferably through the usual rubber section.

Having now described my invention, what I claim as new therein and desire to secure by Letters Patent is as follows:

1. A funnel for talking machines, the walls of which are of maximum thickness at a point between its ends, substantially as set forth.

2. A funnel for talking machines, which is of maximum thickness at a point intermediate its ends and whose thickness decreases gradually toward each end, substantially as set forth.

This specification signed and witnessed this 20th day of May 1905.

THOS. A. EDISON.

Witnesses:

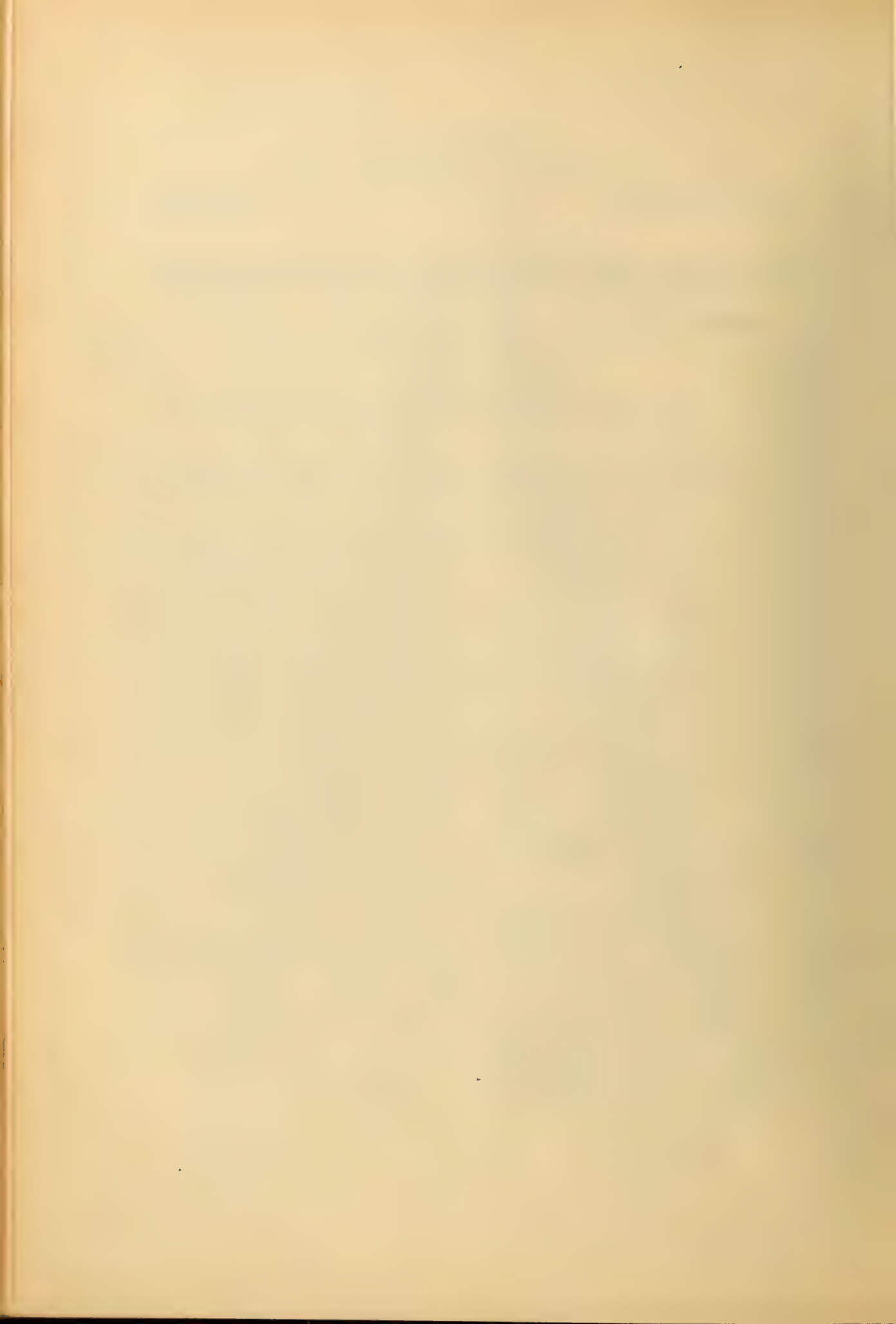
FRANK L. DYER.

ANNA R. KLEHM.

Essex and State of New Jersey, have invented certain new and useful Improvements in Horns for Talking-Machines, (Case C,) of which the following is a description.

My invention relates to improvements in horns adapted for use with phonographs or other talking machines, and my object is to produce a horn adapted particularly for recording purposes and by which superior results will be secured. With funnels as heretofore used, the walls thereof have been capable of vibrating themselves, and are responsive to, and vibrate sympathetically with, certain musical notes, to result in the production of inharmonic sounds, which become recorded. Furthermore, in such vibration of the funnel walls, there is a considerable loss of energy and a proportionate reduction in the effect on the diaphragm, resulting in further weakening and distortion of the recorded sounds.

In carrying my invention into effect, I make use of a funnel that is incapable of vibrating under the effect of ordinary sounds used in this art, by forming it with thick walls presenting, at all points of its longitudinal section, the shape of a truss, and composed of some dead, non-metallic material, like plaster-of-paris, coated with a hard smooth varnish. I have, in fact, constructed a funnel for the purpose, weighing as much as a ton, and whose mouth is several feet in diameter, and which gives no sym-



T. A. EDISON.

SOUND RECORDING APPARATUS.

APPLICATION FILED NOV. 18, 1903. RENEWED JUNE 10, 1909.

943,664.

Patented Dec. 21, 1909.

Fig. 1.

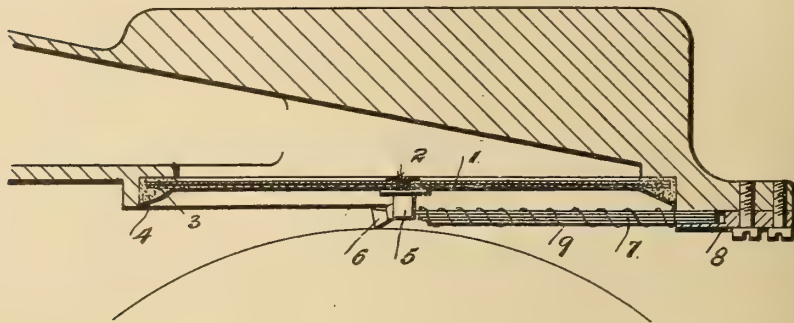


Fig. 2.

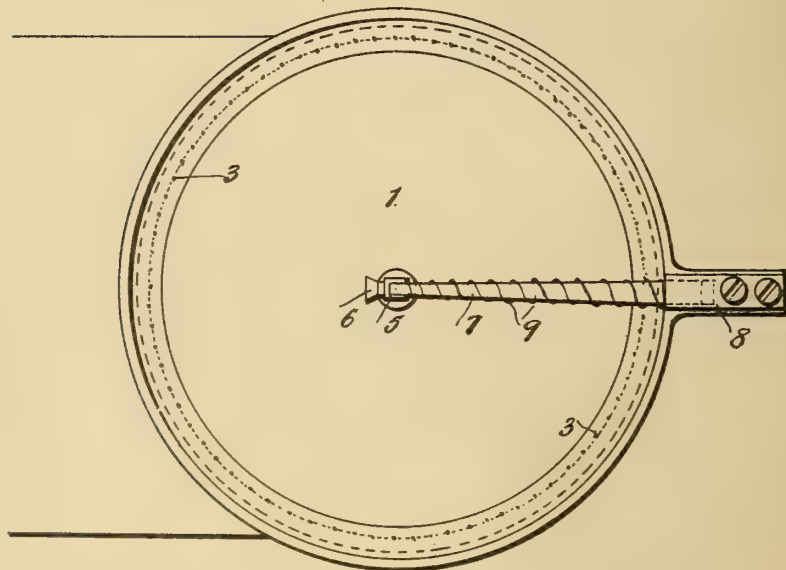
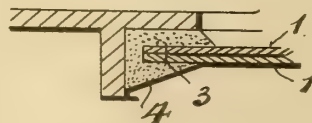


Fig. 3.



Witnesses:

John Louis Lotach.

Albert Louis Smith

Inventor

Thomas A. Edison

by Frank T. Raper,

Attorney

UNITED STATES PATENT OFFICE.

THOMAS A. EDISON, OF LLEWELLYN PARK, ORANGE, NEW JERSEY, ASSIGNOR TO NEW JERSEY PATENT COMPANY, OF ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

SOUND-RECORDING APPARATUS.

943,664.

Specification of Letters Patent.

Patented Dec. 21, 1909.

Application filed November 18, 1903, Serial No. 181,590. Renewed June 10, 1909. Serial No. 501,414.

To all whom it may concern:

Be it known that I, THOMAS ALVA EDISON, of Llewellyn Park, Orange, in the county of Essex and State of New Jersey, have invented certain Improvements in Sound-Recording Apparatus, (Case No. 1122,) of which the following is a description.

My invention relates to an improved apparatus for recording sounds, preferably of the phonograph type wherein the record is of varying depth and width, but it may be utilized in connection with gramophonic apparatus wherein the record is of the same depth and width but of sinuous formation.

The object of the invention is to eliminate, as far as possible, sympathetic vibrations in sound recording apparatus, whereby the vibrations will be always forced and the recording of extraneous or distorted sound waves will be prevented.

In applications for Letters Patent filed November 18, 1903, I describe a method and apparatus for recording sounds, wherein is used a diaphragm whose edges are immersed in a viscous semiliquid, whereby the diaphragm is free to respond to forced vibrations. With an ordinary diaphragm arranged in this way, its fundamental tone is so high that it responds sympathetically only to very high notes, and with such tones generally the amplitude is so slight that the recording knife is not disturbed to any great extent. At the same time tones which are in sympathy with the diaphragm are unduly emphasized, so that it is desirable to eradicate even this small disturbance when the perfect quality of music is to be recorded and reproduced, especially when of instruments the majority of the notes of which are very high, like a piccolo.

To this end, the invention consists, first, in the employment of a diaphragm of a new type, which while free to respond to the sound waves, is dead and non-elastic, so that when once flexed to one side of its medial line, it has no tendency of itself to vibrate to and fro like an elastic body having a fundamental tone of its own. This is important, because if the diaphragm is elastic it stores up energy when forcibly flexed to either side of its medial line, and when released vibrates in accordance with its fundamental tone, which vibrations detract from or add to succeeding sound vibrations, thereby producing interference. With my

non-elastic diaphragm the energy stored up by said flexure is quickly absorbed as heat and work when the diaphragm is released, and the diaphragm has no tendency in returning to pass its medial line because the said energy is consumed during the return of the diaphragm to the medial line, in this respect resembling a dead beat galvanometer. There is practically no tendency for it to swing past the said medial line. In other words, I provide a composite diaphragm comprising members, which while in themselves elastic and capable of flexure or forced vibrations are so hindered in their movement as to be practically incapable of any independent vibration, their elasticity merely serving to bring them back to their medial position when flexed.

The invention consists secondly, in making the so-called reed, which connects with and receives the thrust of the recording knife, also dead and non-elastic, and incapable of vibrating of itself, although free to follow the forced vibrations of the diaphragm by means which operate upon substantially the same principle as the diaphragm.

In order that the invention may be understood, attention is directed to the accompanying drawing forming a part of this specification and in which—

Figure 1 is a longitudinal view on an enlarged scale of a phonographic recording apparatus embodying my invention in its preferred form; Fig. 2 a plan view of the same; and Fig. 3 an enlarged sectional view of a part of the diaphragm.

In all of the above views corresponding parts are represented by the same reference numerals.

The diaphragm is composed of a plurality of disks 1 as shown, preferably formed of mica and of the usual diameter. These disks may all be of the same thickness, but they preferably are of different thicknesses, one being say $\frac{1}{1000}$ of an inch in thickness, the second $\frac{2}{1000}$ of an inch in thickness, etc. Under ordinary conditions it is not desirable to use more than three of these disks in the make up of the composite diaphragm. The disks are assembled together with a thin layer of a very viscous permanent semiliquid, such as burned rubber, between them and are secured by a rivet 2 at the center, made preferably of aluminum, and at their

edges by a sewing 3 of silk thread. It will, of course, be understood that the disks may be sewed together by additional stitchings, arranged concentrically between the center and circumference, but under ordinary conditions a single line of stitching is sufficient. The edges of the composite diaphragm are immersed in a body 4 of a viscous semi-liquid, as I describe in my said applications. A composite diaphragm constructed in this way has its capacity to execute movements sympathetically entirely destroyed for the reason that the elasticity of the disks which under ordinary conditions would cause the diaphragm to vibrate to and fro, is here absorbed by friction developed between the surfaces of the disks and the viscous semi-liquid and by friction developed between the molecules of the said semi-liquid, the result being that while the diaphragm is free to execute forced vibrations due to sound waves, no single impulse has a tendency to cause the diaphragm to execute a series of vibrations. The structure may be appropriately called a dead beat diaphragm.

Although my improved composite diaphragm is very sensitive to forced vibrations so as to accurately follow and record the sound-waves, yet if flexed to one side or the other of its medial line the pressure released, it immediately returns to its normal form without partaking of vibrations.

Secured to the under-side of the rivet 2 is an aluminum foot 5 held in place by shellac or other cement and carrying the recording knife 6 of any suitable construction.

The so-called reed 7 whose front end is cemented to the foot 5 and which receives the thrust of the recorder, is secured at its rear end by a clamp 8 and embodies the same idea as the improved diaphragm, inasmuch as it is also dead and non-elastic and incapable of vibrating sympathetically. This reed is therefore composed of a series of thin glass sections preferably of varying thickness, separated by thin layers of a viscous permanent semi-liquid, like burned rubber, the whole being wound by a silk thread 9. Instead of securing the reed sections together by a silk thread, a series of small rubber bands may be employed with good results. It will of course be understood that the reed may be made of other material than glass, such as thin splints of bamboo.

With the arrangement described, I eliminate all vibrations other than those which are forced so that a record formed is characterized by being composed solely of graphic representations of the sound-waves themselves recorded with absolute accuracy and free of extraneous disturbances and distortion.

Having now described my invention what I claim as new and desire to secure by Letters Patent, is as follows:

1. A composite diaphragm, comprising an elastic member and a permanently semi-liquid material of great internal friction or viscosity applied over the surface thereof, whereby said member is rendered practically incapable of sympathetic vibration, substantially as set forth. 70

2. A composite diaphragm comprising two or more elastic members and means applied over the adjacent surfaces thereof for rendering said members practically incapable of sympathetic vibration, substantially as set forth. 75

3. A composite diaphragm comprising two or more elastic members and a permanently semi-liquid material characterized by great internal friction or viscosity applied to said members over the surfaces thereof, whereby said members are rendered practically incapable of sympathetic vibration, substantially as set forth. 80 85

4. A composite diaphragm comprising two or more rigid disks secured together with a viscous semi-liquid between the disks, substantially as set forth. 90

5. A composite diaphragm comprising two or more rigid disks of different thicknesses secured together with a viscous semi-liquid between the disks, substantially as set forth. 95

6. A composite diaphragm composed of two or more rigid disks secured together at the center with a viscous semi-liquid between the disks, substantially as set forth.

7. A composite diaphragm composed of two or more rigid disks secured together at their center and edges and a viscous semi-liquid between the disks, substantially as set forth. 100

8. A composite diaphragm composed of a plurality of disks riveted together at the center and sewed at their edges with a viscous semi-liquid between the disks, substantially as set forth. 105

9. A composite reed for receiving the thrust of a phonographic recorder comprising an elastic member and means for rendering said member practically incapable of sympathetic vibration, substantially as set forth.

10. A composite reed receiving the thrust of phonograph recorders composed of a plurality of thin leaves with a viscous semi-liquid between them, substantially as set forth. 115

11. A composite reed for receiving the thrust of phonograph recorders composed of a series of leaves of varying thickness with a viscous semi-liquid between them, substantially as set forth. 120

12. A reed for receiving the thrust of phonograph recorders composed of a series of glass leaves with a viscous semi-liquid between them, substantially as set forth. 125

13. A composite reed for receiving the thrust of phonograph recorders composed of 130

a series of thin leaves with a viscous semi-liquid between them and wound with an exterior thread, substantially as set forth.

14. In a phonograph recorder, the combination of a composite diaphragm comprising an elastic member and means for rendering said member practically incapable of sympathetic vibration, a recording stylus connected to the diaphragm, and a composite reed receiving the thrust of said stylus and comprising an elastic member and means for rendering said member practically incapable of sympathetic vibration, substantially as set forth.

15. In recording apparatus, the combina-

tion of a composite diaphragm composed of a plurality of disks with a viscous semi-liquid between the disks, a recording stylus connected to said diaphragm and a composite reed connected to the stylus and composed of a series of leaves with a viscous semi-liquid between them, substantially as set forth.

This specification signed and witnessed this 16 day of Nov. 1903.

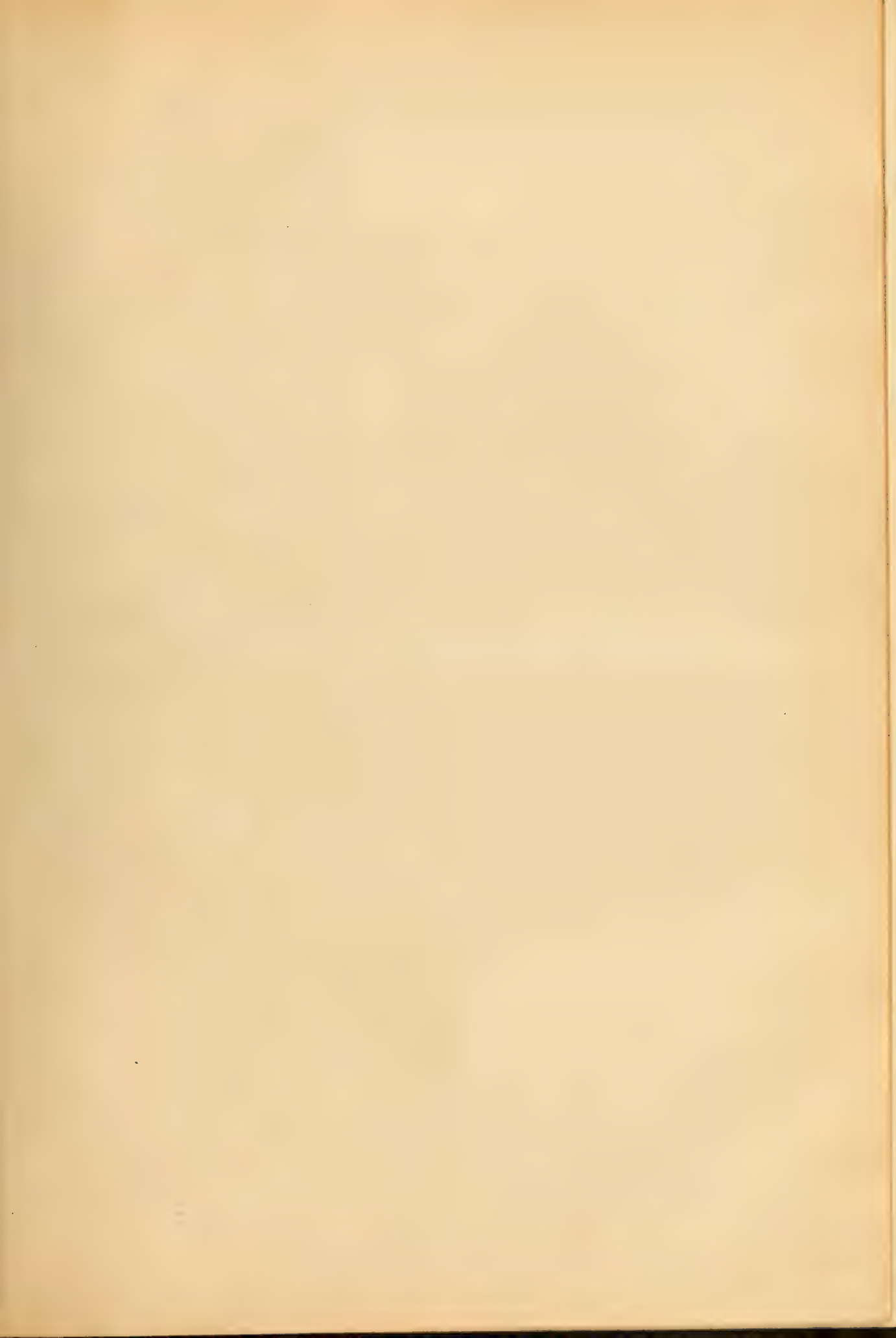
THOMAS A. EDISON.

Witnesses:

FRANK L. DYER,

J. F. COLEMAN.

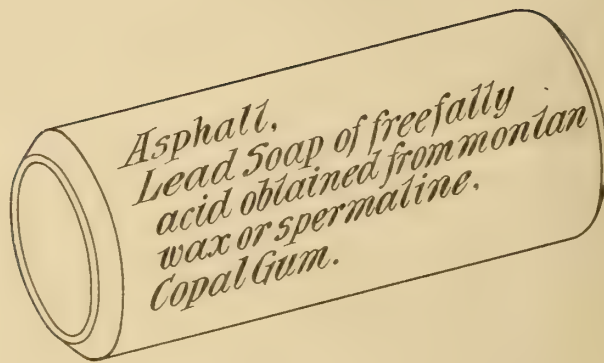




J. W. AYLSWORTH.
SOUND RECORD COMPOSITION.
APPLICATION FILED MAY 25, 1907.

944,474.

Patented Dec. 28, 1909.



Witnesses:
Frank Lewis
Herbert H Dyke

Inventor:
Jonas W. Aylsworth
By Frank W. Dyer
Atty.

UNITED STATES PATENT OFFICE.

JONAS W. AYLSWORTH, OF EAST ORANGE, NEW JERSEY, ASSIGNOR TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

SOUND-RECORD COMPOSITION.

944,474.

Specification of Letters Patent.

Patented Dec. 28, 1909.

Application filed May 25, 1907. Serial No. 375,725.

To all whom it may concern:

Be it known that I, JONAS W. AYLSWORTH, a citizen of the United States, residing at 223 Midland avenue, East Orange, county of Essex, and State of New Jersey, have invented certain new and useful Improvements in Sound-Record Compositions, of which the following is a description.

In Letters Patent, No. 920,245, granted May 4th, 1909, Serial No. 342,317, I describe certain new and useful improvements in phonograph record compositions in which asphalt is admixed with a metallic stearate, such as stearate of lead, and preferably also with a resin gum such as copal gum, resulting in an excessively hard, tough, and durable material. My present invention is designed particularly as an improvement on this composition, but it may be used in connection with any composition in which stearic acid (in which expression is included its well known equivalent—palmitic acid) or metallic stearates are used. For instance, the improvements may be employed in connection with the manufacture of the well known composition which is now used for the production of talking machine blanks for making original or master records and consisting of stearates and palmitates of soda and alumina, together with an anti-hygroscopic ingredient, such as ceresin; or the improvement may be employed, for example, in the manufacture of compositions for making duplicate sound records, such as I describe in my Patent No. 782,375 of February 14th, 1905, in which carnauba wax is added to the blank material in such a way that the free alcohols of the wax will combine with the free stearic acid of the composition to form a hard wax-like compound ether, which gives to the composition many of its desirable properties; or instead, the improvements may be employed in connection with the special composition disclosed in Letters Patent No. 880,707, granted March 3, 1908, in which I disclose the employment of ebonite or montan wax, as available substitutes for the carnauba wax of the composition of my Patent No. 782,375. Preferably, however, the improvements are designed for use in connection with compositions as disclosed in my patent first above referred to as I seek to produce a composition which shall be excessively hard and

tough, while at the same time having a smooth surface in order to make it practicable to make commercial records with a considerably finer pitch or record groove so as to increase the length of the reproduction. The invention is based on the discovery that a certain fatty acid, presently to be mentioned, may be substituted in these compositions for the stearic acid or palmitic acid and which results in the production of very much harder and more durable compositions than when stearic or palmitic acid is used. The fatty acid which I have discovered as an available material for use in this art is the fatty acid present in montan wax and which I shall refer to as montan acid. It may be used either alone or in combination with stearic or palmitic acid.

In my Patent No. 880,707 above referred to I refer to montan wax as being supplied in this country by the Strohmeier & Arpe Company, at 64 Pearl street, New York city, as being a wax-like substance of a dark polished brown color, somewhat resembling discolored carnauba wax, and as being probably prepared from bituminous brown coal under the process disclosed in U. S. Patent No. 689,381 of December 24th, 1901. A highly refined form of montan wax is also sold in this country under the trade-name "Spermatine" and contains from 75 to 90% of a fatty acid of very high molecular weight, which I refer to as montan acid. In obtaining the montan acid from the montan wax or spermatine, I may combine the same with a base such as lead oxid or with an alkali such as soda or potash, or with an alkaline earth, such as lime, thereby forming a metallic soap with the free montan acid. The hydrocarbon ingredient remaining in the soap may be then removed by distillation with superheated steam at a temperature from 500 to 750° F. with or without vacuum; or the hydrocarbon may be extracted by a suitable solvent such as naphtha, petroleum ether, or benzene, I consider it important to remove this hydrocarbon ingredient when the montan acid is to be used in connection with compositions in which asphalt is used, since its presence interferes with the miscibility of the asphalt. The soap thus formed and preferably with the hydrocarbon ingredient removed is now decomposed in any of the well known ways for recovering the free

fatty acid therefrom. The montan acid thus obtained may be used in any of the compositions in which stearic acid is used with the important advantage that the compositions made therefrom are very much harder and very much more durable than when stearic acid is used.

It will be understood that in making the soap composition disclosed in my Patent No. 920,245 above referred to, in which stearate of lead is preferably used in combination with asphalt, the metallic soap originally formed with the free fatty acid of the montan wax or spermatine may be a lead soap; or, in other words, the spermatine or montan wax may be combined with lead oxid to form a lead soap with the free montan acid. After the hydrocarbon ingredient has been separated from this lead soap, the latter need not be decomposed for the recovery of the free fatty acid, but may be used directly as an ingredient in the composition in the same way as the stearate of lead. This of course is the desirable method of making this particular composition, as in this way the step of decomposing the soap and recovering the free fatty acid is dispensed with.

Attention is hereby directed to the accompanying drawing, forming part of this application, and illustrating a conventional record tablet having inscribed thereon the ingredients of a composition embodying my invention.

Having now described my invention, what I claim as new and desire to secure by Letters Patent is as follows:

1. A composition suitable for the manufacture of phonograph records which contains the fatty acid obtained from montan wax or spermatine, substantially as set forth.

2. As an ingredient for use in the make-up of sound record compositions, a metallic soap

of the free fatty acid obtained from montan wax or spermatine, substantially as set forth.

3. As an ingredient for use in the make-up of sound record compositions, a lead soap of the free fatty acid obtained from montan wax or spermatine, substantially as set forth.

4. An improved composition for sound records, comprising a mixture of asphalt and a metallic soap of the free fatty acid obtained from montan wax or spermatine, substantially as set forth.

5. An improved composition for sound records, comprising a mixture of asphalt and a lead soap of the free fatty acid obtained from montan wax or spermatine, substantially as set forth.

6. An improved composition for sound records, comprising a mixture of asphalt, a metallic soap of the free fatty acid obtained from montan wax or spermatine and a resin gum, substantially as set forth.

7. An improved composition for sound records, comprising a mixture of asphalt, a lead soap of the free fatty acid obtained from montan wax or spermatine, and a resin gum, substantially as set forth.

8. An improved composition for sound records, comprising a mixture of asphalt, a metallic soap of the free fatty acid obtained from montan wax or spermatine, and copal gum, substantially as set forth.

9. An improved composition for sound records, comprising a mixture of asphalt, a lead soap of the free fatty acid obtained from montan wax or spermatine, and copal gum, substantially as set forth.

This specification signed and witnessed this 7th day of May 1907.

JONAS W. AYLSWORTH.

Witnesses:

FRANK L. DYER.

FRANK D. LEWIS.

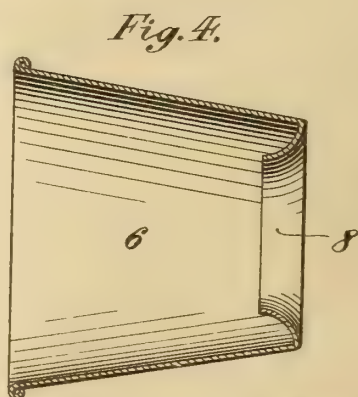
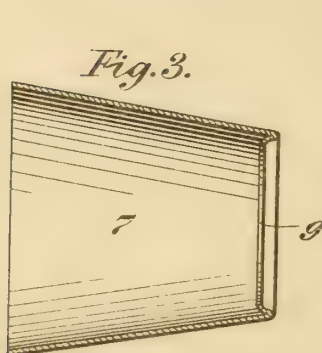
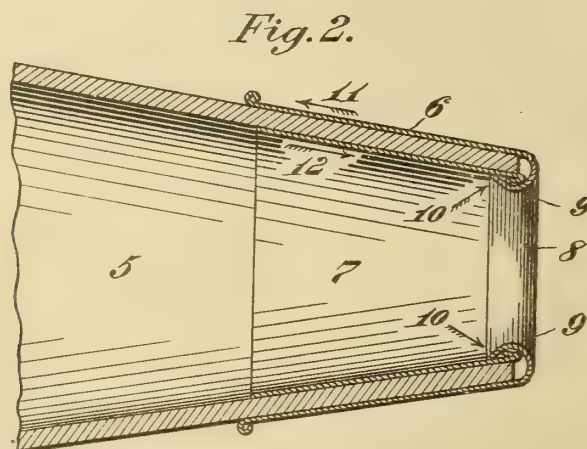
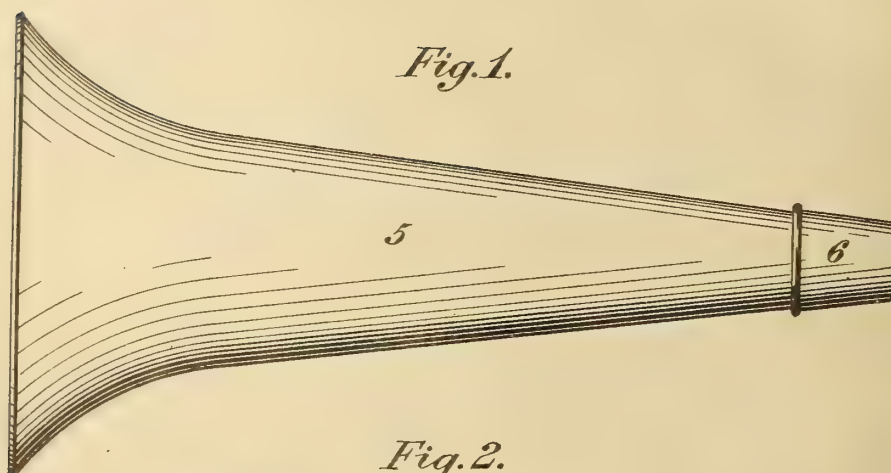


A. G. SOISTMANN.
HORN.

APPLICATION FILED JULY 11, 1907.

944,516.

Patented Dec. 28, 1909.



WITNESSES:

Jas C. Holmsmith
Chas. Roseman

INVENTOR

Adolph G. Soistmann

BY

Wm. C. Coe, d. d. d.

ATTORNEY.

UNITED STATES PATENT OFFICE.

ADOLPH G. SOISTMANN, OF PHILADELPHIA, PENNSYLVANIA.

HORN.

944,516.

Specification of Letters Patent.

Patented Dec. 28, 1909.

Application filed July 11, 1907. Serial No. 383,258.

To all whom it may concern:

Be it known that I, ADOLPH G. SOISTMANN, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented a new and useful Horn, of which the following is a specification.

My invention relates to improvements in horns.

My invention especially relates to horns used for talking machines, and comprises improved means for reinforcing the end of the horn.

My invention comprises inner and outer reinforcing tapered sleeves and means for securing or locking said sleeves as hereinafter claimed.

Referring to the drawings:—Figure 1 is an elevation of the horn containing my improved reinforcing sleeve. Fig. 2 is a longitudinal section of the small end of the horn on an enlarged scale. Fig. 3 is a section of the inner sleeve member. Fig. 4 is a section of the outer sleeve member.

Similar numerals refer to similar parts throughout the several views.

My invention is especially adapted for horns constructed of wood, fiber or similar material, but need not necessarily be confined to horns of that construction.

Referring to Fig. 2 the outer sleeve member 6 is tapered and provided with an inwardly curved or turned in end 8. The member 7 is provided with an inwardly curved or turned in portion 9 as shown in Fig. 3. The tapered outer sleeve member 6 is forced upon the small end of the horn as far as it will go, in the direction of the arrow 11, in Fig. 2; while the inner sleeve member 7 is forced into the small end of the horn as far as it will go, in the direction of the arrow 12, in Fig. 2. It will be seen that the outer member 6 can now only move in the direction reverse to the arrow, while member 7 can only move in direction reverse to arrow 12. If the inner turned in portion or lip 8 of member 6 is bent down over the turned in portion or lip 9, of member 7, as shown at 10 in Fig. 2, it will be evident that movement of the member 6 in the direction of the arrow 11 will be prevented by the engagement between the lip 8 and the lip

9 of said members 6 and 7 respectively, while similarly movement in the direction reverse to arrow 12 of member 7 is also prevented. Therefore said members 6 and 7 are absolutely locked against movement in either direction and cannot be disengaged from the small end of the horn. This construction is especially desirable where a stud is used on the sleeve member 6 for engagement with the talking machine, as such engagement has heretofore previously caused the disengagement or pulling off of the sleeve member 6.

What I claim is:

1. In combination with a horn, a tapered sleeve surrounding the tapered end thereof, and a tapered sleeve fitting within said end, the outer sleeve having a lip turned around the edge of and projecting into the inner sleeve to lock the same therewith.

2. The combination of a horn, a tapered sleeve surrounding the tapered end thereof, and a tapered sleeve fitting within said tapered end, the outer sleeve being turned in around the edge of the horn and the edge of the inner sleeve.

3. In combination with a horn, a tapered sleeve surrounding the tapered end thereof, and a tapered sleeve fitting within said tapered end, each sleeve having curved inwardly turned lips at the small end thereof, the lip of the outer sleeve being spun around that of the inner sleeve after being assembled.

4. In combination with a horn, a tapered sleeve fitting over the tapered end of the horn, a tapered sleeve fitting within said tapered end, said sleeves having turned in portions, one locking with the other, substantially as described.

5. In combination with a horn of fibrous material, a tapered sleeve surrounding the tapered end of the horn and a tapered sleeve fitting within said tapered end having a lip or ridge around its smaller margin, the tapered sleeve surrounding the horn having an inwardly curved lip at its smaller end projecting into the tapered sleeve within the horn and engaging with the lip thereof.

ADOLPH G. SOISTMANN.

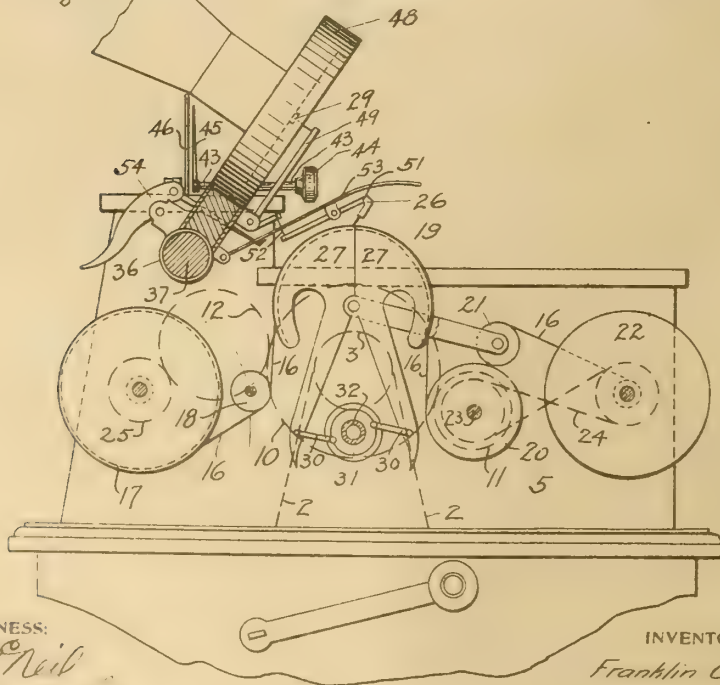
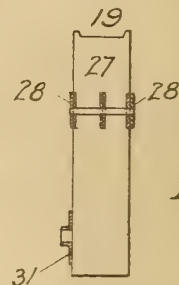
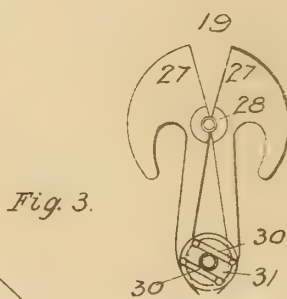
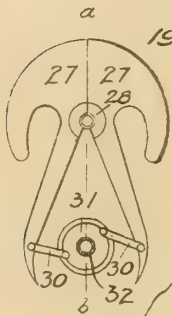
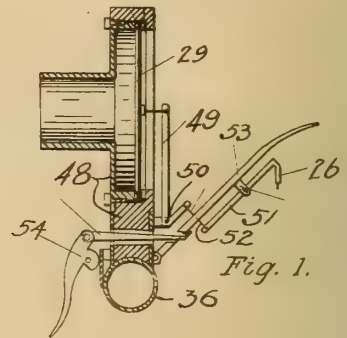
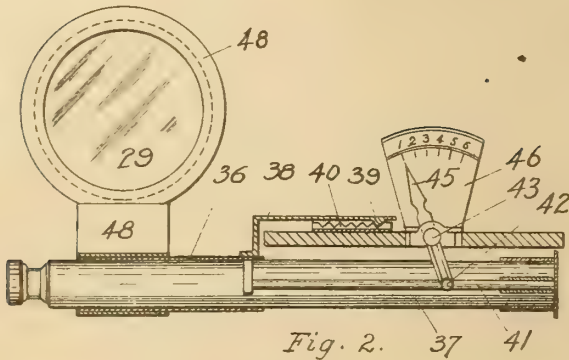
Witnesses:

EUGENE ZIEGLER,
MAE HOFMANN.

F. C. GOODALE.
SOUND REPRODUCING MACHINE.
APPLICATION FILED JUNE 26, 1908.

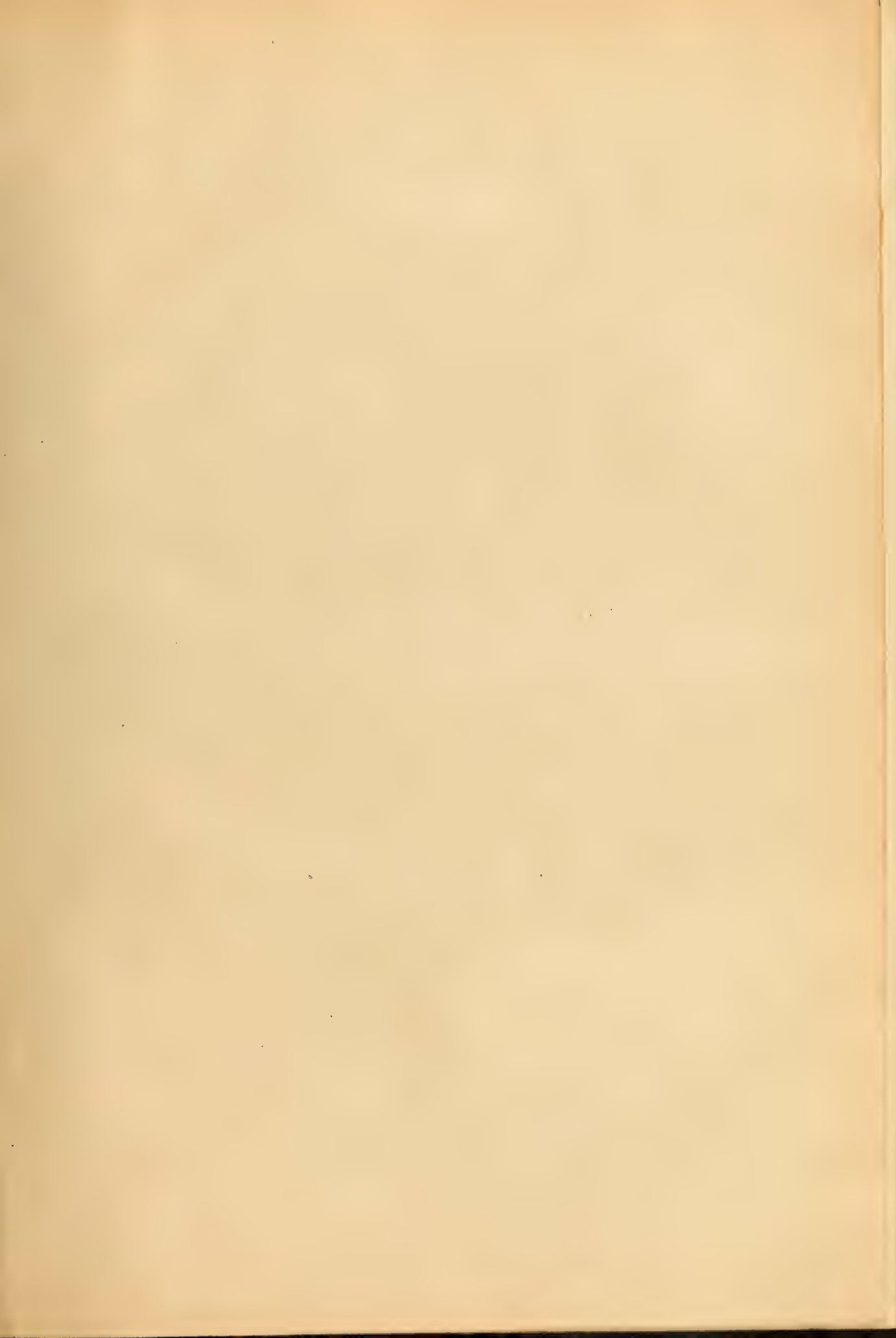
944,608.

Patented Dec. 28, 1909.
2 SHEETS—SHEET 1.



WITNESS:
M. J. Neil
J. S. Llewellyn

INVENTOR
Franklin C. Goodale
BY *J. D. Elliott*
ATTORNEY



F. C. GOODALE.
SOUND REPRODUCING MACHINE.
APPLICATION FILED JUNE 28, 1908.

944,608.

Patented Dec. 28, 1909.

2 SHEETS—SHEET 2.

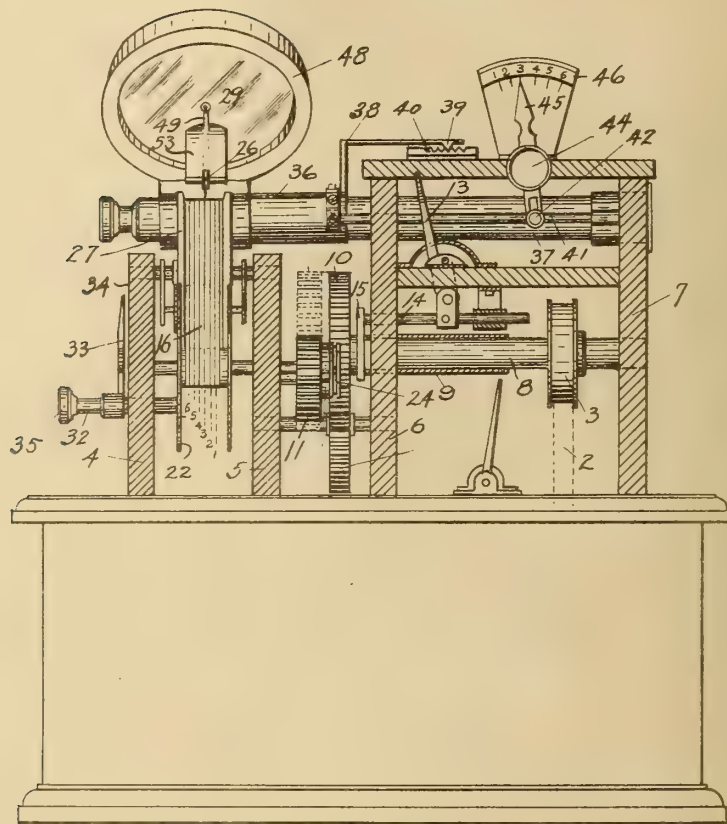


Fig. 7.

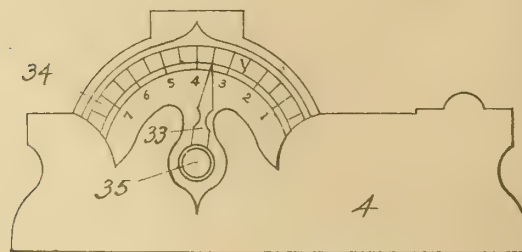


Fig. 8.

WITNESS:

W. J. Neil
W. J. Neil

INVENTOR

Franklin C. Goodale

BY

J. P. Elliott
ATTORNEY

UNITED STATES PATENT OFFICE.

FRANKLIN C. GOODALE, OF TACOMA, WASHINGTON.

SOUND-REPRODUCING MACHINE.

944,608.

Specification of Letters Patent.

Patented Dec. 28, 1909.

Application filed June 26, 1908. Serial No. 440,468.

To all whom it may concern:

Be it known that I, FRANKLIN C. GOODALE, a citizen of the United States of America, residing at Tacoma, in the county of Pierce and State of Washington, have invented certain new and useful Improvements in Sound-Reproducing Machines, of which the following is a specification, reference being had therein to the accompanying

10 drawing.

This invention relates to sound reproducing machines, and especially to those adapted to use a flexible ribbon on which the record has been made, and has for its object to provide a device whereby the intensity of the sound may be varied at will without changing the speed of operation or the form or size of the horn.

Other objects are to simplify and cheapen the mechanism and to increase the length of time that a record may be operated, and to diminish the bulk of the record thus making the machine much more convenient and salable than those at present in use.

25 I attain these objects by the mechanisms and devices illustrated in the accompanying drawings, in which—

Figure 1 is a vertical section of the reproducing mechanism; Fig. 2 is a front view thereof showing the device for shifting the reproducer from one set of records to another parallel set; Figs. 3 and 4 are front views of the sound amplifier in its closed and opened positions respectively; Fig. 5 is a vertical section thereof on the line *a—b* in Fig. 3; Fig. 6 is a side view of the machine with one of its standards removed in order to show the mechanism; Fig. 7 is a rear view of the machine, and Fig. 8 is a view of the dial of the device for controlling the sound amplifier.

Similar numerals of reference refer to similar parts throughout the several views.

The great objection and drawback to the commercial use of sound reproducing machines is found in the limited time that they may be operated on account of the form of record. This fact is well known to all those who have daily use of the machine for commercial purposes, as well as those who use the machine for the reproduction of musical compositions, and it is with this drawback in view that I have devised the hereinafter described machine. Besides this, the circumstances under which such a machine may be used will vary from time to time

and therefore the loudness of the sound which is suitable to some circumstances would not be suitable to others, and it is desirable and even necessary to have means for controlling the loudness of the sound at will.

Referring now to the drawings, the motor mechanism by means of which the machine is driven is preferably mounted within the box 1, which acts as the base for the machine. The driving belt 2 passes through the top of the box and engages the pulley 3 suitably mounted on the machine. The machine itself is mounted between the parallel frames 4, 5, 6 and 7, which are secured to the top of the box 1, and is driven from the said pulley 3 by the following means: The said pulley 3 is mounted on a shaft 8 which has a sleeve 9 rotating therewith but slidably mounted thereon, and the said sleeve 9 carries a gear 10 adapted to drive either one of two gears 11 and 12, according to the position in which said gear 10 may be placed. This position is controlled by means of a lever 13 pivoted to the frame work of the machine and connecting with the slidable sleeve 9 by means of a bar 14 carrying a yoke 15 engaging in a collar in said sleeve 9, so that by moving the lever 13 from one position to the other the gear 10 is slid from engagement with one gear 11 to engagement with the other gear 12. The purpose of this arrangement is to provide a mechanism for rewinding the record ribbon 16 after it has been run through the machine, and this rewinding is preferably done at a higher rate of speed than the unwinding thereof when the record is being used. The record consists of a continuous ribbon 16 of suitable flexible material prepared to receive on its surface the impressions from a diaphragm with a stylus adapted to record the sound waves received thereby thereon. The record ribbon thus prepared and inscribed is wound on a reel 17 and passes therefrom past the idler roller 18, over the guide and sound amplifier 19, and then part way around the driving drum 20, and the second idler 21, and so on to the reel 22 on which it is temporarily wound. The record ribbon 16 is driven by frictional contact with the driving drum 20, which may be made of any suitable material having sufficient friction between it and the material of which the record ribbon is made, so that the turning of the drum 20 will draw the ribbon 16 through the machine. The driving drum 20

is mounted on the same shaft 23 as the above mentioned gear 11 and is driven thereby when the large gear 10 engages the said gear 11. A cross belt 24 mounted on the shaft 23 beside the driving drum 20 engages the temporary take-up reel 22 and drives it so that as the record ribbon 16 is unwound from one reel 17 it is wound on the other. When the main gear 10 engages the other gear 12, to rewind the ribbon 16, it acts through a train of gears consisting of the said gear 10, a large gear 12 and a smaller gear 25 engaging therewith and on the shaft of which the record ribbon reel 17 is mounted. Since the action passes through one more gear when in this position than when in the driving position the direction of motion is reversed without reversing the direction of the main gear, and since the last gear 25 of the train is smaller than the gear 11 of the driving drum, the rewinding action is correspondingly faster than the unwinding action.

The ribbon 16 as it passes from one drum to the other, slides over a device which I have called the sound amplifier. The reproducing point 26 engages the record ribbon 16 at a point exactly in the middle of this amplifier. The amplifier consists of a pair of non-rotative curved and flanged bodies 27 over which the record 16 slides, and which are hinged together at 28 and are separable at their upper surface where the record ribbon 16 slides. I have found that when these two surfaces are in contact the vibration of the reproducer point 26 is much less than when they are separated, and that the extent of the vibration thereof increases with the distance between the said parts of the amplifier. The reason for this is that the ribbon 16 being flexible and being in tension at this point where it engages the reproducing point, is itself vibrated and greatly increases the vibration of the reproducing point 26, so that the vibration of the diaphragm 29 operated by the reproducing point 26 is increased. The extent of the opening between the two parts 27 of the amplifier is governed by means of a pair of links 30 secured to a disk 31 mounted on a rod 32, which is suitably mounted in the frame work of the machine and which carries a pointer 33 adjacent to a dial 34 secured to the frame of the machine, and which has a small knob 35 at its end whereby it may be turned so that the pointer 33 shall indicate on the dial 34 any desired number. As the pointer 33 is swung on the dial from right to left (see Fig. 8) the distance between the parts 27 of the amplifier, over which the record ribbon 16 has to pass, increases from naught to a maximum, hence it is evident that any desired loudness within the compass of the machine may be attained by turning the rod 32 so that the pointer will indicate on the dial the

desired distance between the parts of the amplifier.

It is evident from the above that the reproducer does not have to move in this machine, since the reproducing point 26 always occupies the same position, as the record is made in a straight line on the record ribbon. But, since the record is itself a very minute line, it is evident that I can, without materially increasing the size of the record ribbon, place a number of records on the same ribbon side by side, and all that is necessary to do to shift the machine from one record to the other is to shift the reproducer so that the point 26 thereof will engage whichever one of the records on the ribbon it is desired to have reproduced. I have indicated six records on the ribbon illustrated in the drawings, but it is evident that this may be changed to any desired number. The entire reproducing device is mounted on a sleeve 36 which is slidable on a rod 37 mounted in the frame of the machine, a spring 38 having a pawl 39 at its end engages in the rack 40 mounted on the frame of the machine so that the sleeve 36 will be held by the said pawl 39 and rack 40 in any position in which it may be placed. In order to shift it from one position to another a bar 41 is fastened to the sleeve 36 and is moved longitudinally by the lever 42 which is secured to a transverse horizontal rod 43 having a knob 44 at one end whereby it may be turned, and having a pointer 45 at its other end, adjacent to a dial 46 mounted on the frame of the machine. This dial 46 has figures thereon which correspond to the notches or teeth of the rack 40 and with the records on the record ribbon 16 so that if it is desired to reproduce record No. 1 the pointer 45 is made to indicate on the dial 46 the figure 1, or if any of the other records are to be reproduced the corresponding number on the dial is indicated by the pointer.

The reproducing mechanism itself consists of the usual diaphragm 29 mounted in suitable framework 48 and engaged at its center by the long end 49 of a lever pivoted to the frame at 50. This pivoted lever is acted on in my invention by a second pivoted lever 51 which is connected thereto by a link 52 and which carries at its other end the reproducing point 26. By this arrangement I have increased the leverage of the reproducing point 26 so as to make the machine much more sensitive. The diaphragm 29 and first lever are fixed in position except as to the adjustments for reproducing various records, as above described, but the second lever 51 is removable from the record by means of a hanger 53 to which the second lever 51 is pivoted and which is itself pivoted to the frame work 48 of the diaphragm and which is engaged by a thumb

lever 54 to lift it from its engaging position when it is desired to remove it from the ribbon either for rewinding or for changing from one record to the other.

5 It is evident from the above that the field of usefulness of such a sound reproducing machine has been greatly increased in several ways. In the first place, the length of the ribbon wound on the reel 17 can be made
10 to take a record several hours in length, since the ribbon is itself very thin; further, a single ribbon can have a number of separate records thereon, any one of which may be reproduced at any time; and further, the
15 intensity of the sound can be varied at will to satisfy the circumstances under which the reproduction is to be made.

Having described my invention, what I claim is:

20 1. In a device of the class described, the combination of a record support, a flexible record-body engaging the same, and sound-producing means engaging said record-body, said record-support comprising connected
25 members adapted to be brought together to form a continuous surface, or separated to form spaced-apart surfaces.

2. In a device of the class described, the combination of a record-support, a flexible
30 record-body engaging the same, and sound-producing means engaging said record-body, said record-support including members pivoted together and adapted to be brought together to form a continuous surface or separated
35 to form spaced-apart surfaces.

3. In a device of the class described, the combination of a record-support, a flexible record-body engaging said record-support, and sound-producing means engaging said
40 record-body, said record-support embracing two pivoted together members having rounded upper surfaces, and means adapted to separate said members, or bring them together.

45 4. A device of the class described comprising a record-support formed of two pivoted together members, a flexible record-body engaging said record-support, sound-producing means engaging said flexible record-
50 body, a slidable sleeve carrying said sound-producing means, means for supporting said sleeve, and means for actuating said sleeve, said sleeve having applied thereto a spring-pawl and a rack engaged by said pawl.

55 5. A device of the class described comprising a record-support formed of two pivoted together members, a flexible record-body engaging said record-support, sound-producing means engaging said flexible record-
60 body, a slidable sleeve, a spring pawl attached to said sleeve, a rack engaged by said

pawl, a lever having connected thereto a registering pointer, and means of connection between said lever and said sleeve.

6. A device of the class described, comprising a record-support formed of two pivoted together members, a flexible record-body engaging said record-support, sound-producing means, a slidable sleeve carrying said sound-producing means, and means for effecting the movement and retention of said
70 sleeve at required points of adjustment, said sound-producing means including a lever connected to the diaphragm thereof, means for actuating said lever, and a second lever
75 connected to the aforesaid lever and carrying means engaging said flexible record-body.

7. In a sound reproducing machine, the combination of a pair of record supports
80 with free space therebetween; a flexible record body engaging said supports and passing over the space therebetween; and sound producing means engaging said record body at a point between said supports.

8. In a sound reproducing machine, the combination of a pair of record supports with free space therebetween; means for adjusting said supports relatively to each other whereby the space therebetween is adjusted;
90 a flexible record body engaging said supports and passing over the space therebetween; and sound producing means engaging said record body at a point between said supports.

9. In a sound reproducing machine, a
95 sound amplifier comprising a pair of adjustable supports with space therebetween, over which the record body passes, and at the median point of which the sound producing means engages the record body.

10. In a sound reproducing machine, the combination of a pair of flanged record supports with free space therebetween; a flexible record body guided by and engaging said flanged supports and passing over the space
105 therebetween; and sound producing means engaging said record body at a point between said supports.

11. In a sound reproducing machine, the combination of a pair of record supports
110 hinged together; a controlling rod adjustably supported in the machine; and a pair of links secured to said record supports and to opposite sides of said controlling rod, whereby the adjustment of said rod adjusts the
115 relative positions of said record supports.

In testimony whereof I affix my signature in presence of two witnesses:

FRANKLIN C. GOODALE

Witness:

PEARL GOODALE.

CARLE BENNETT.







SMITHSONIAN INSTITUTION LIBRARIES



3 9088 00644 5456